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THE
NATURALIST:

A
MONTHLY JOURNAL OF

NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

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WILLIAM WEST, F.L.S.

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PREFACE.

ON the completion of another volume we desire to thank our numerous contributors, whose papers have not only enabled us to maintain the interest and value of the journal, but have helped also to increase the number of subscribers. To them we are also indebted for generous assistance in meeting the cost of illustrations, without which many of the papers would have materially suffered.

We earnestly desire to enlarge the journal, and hope the increased support will shortly be sufficient to justify us incurring this extra responsibility. Such an improvement would prevent delay in the publication of many papers and notes of interest.

In view of the early completion of several monographs dealing with the Fauna and Flora of our area, we should welcome contributions tending to throw more light on problems of geographical distribution, especially with the object of providing materials for a zoological survey, on lines similar to those followed in the botanical survey.

Mr. W. E. L. Wattam has kindly prepared the Index to this volume.

T. S.

T. W. W.

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T. SHEPPARD, F.G.S., Museum, Hull.

PUBLICATIONS RECEIVED.

Transactions of the Rochdale Literary and Philosophical Society, Vol. 7. [Society.
Zoologist, November 1903. [Editor.]

Transactions of the Hull Geological Society, 1900-1901. [Society.]

Notes on the History, Ornithology, etc., of the Vale of Derwent, Vol. 4. [Nat. Hist. Society.]

Annales del. Museo Nacional de Monte Video, Tomo II. [Museum.]

Some Volcanic Ashbeds of Montana, J. P. Rowe. [University of Montana.]

Irish Naturalist, October and November 1903. [Editor.]

International Congress of Botany, Circular. [Congress.]

New Mexico College of Agriculture, Bulletin 47. [College.]

Aquila, Tom. 10, Budapest. [Editor.]

Animal Life, November 1903. [Editor.]

Nautilus, November 1903. [Editor.]

Knowledge, December 1903. [Editor.]

Bird Notes and News, December 1903. [Editor.]

Halifax Naturalist, December 1903. [Editor.]

Entomologist, November and December 1903. [Editor.]

Entomologists' Record, November 1903. [Editor.]

Nature Notes, November and December 1903. [Editor.]

The New Phytologist, November 1903. [Editor.]

Le Mois Scientifique, November 1903. [Editor.]

La Feuille des Jeunes Naturalistes, November 1903. [Editor.]

Société Royale Malacologique. [Society.]

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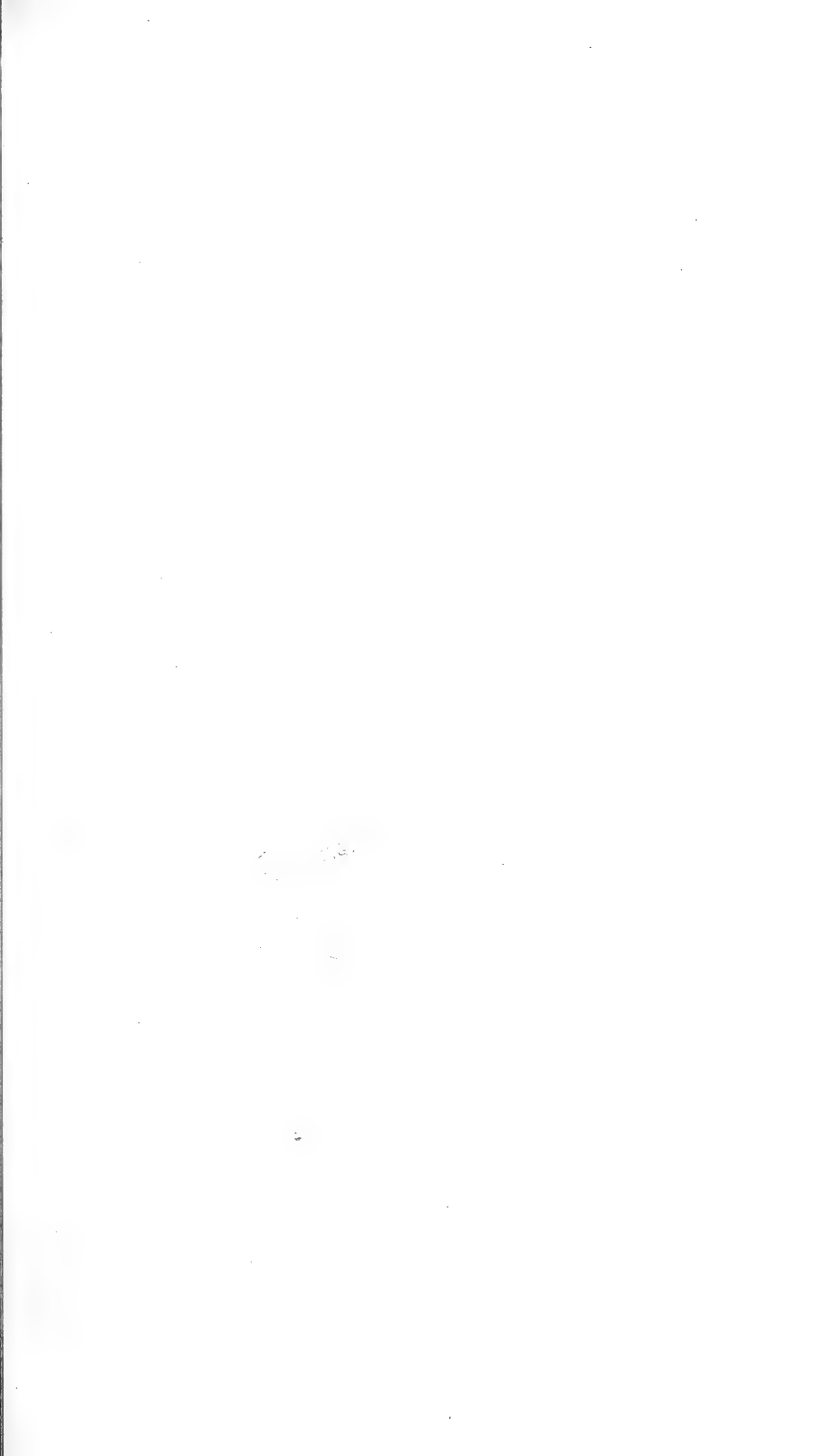
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THE NATURALIST

FOR 1904.

NEW FUNGI.

CONTRIBUTED BY THE MYCOLOGICAL MEMBERS OF THE UNION.

AFTER the success attending the Helmsley Foray it was thought the time was ripe for the bringing together for publication of a miscellaneous batch of most interesting species met with during the last few years in various Yorkshire localities.

It will be noted that the list comprises seventeen species not before recorded for Britain, no less than nine of which are new to science.

There needs no particulars in this short introduction as to fungus or finder, seeing that both are given in all cases under each species.

The paper is accompanied by a coloured plate, the drawings for which were executed by the President of the section, who also conducted the research work in connection with the life-history of *Symphosira parasitica*.

Entoloma Farrahi Mass. et Crossl. (sp. nov.). Figs. 1-4 on plate.

Pileo cylindric-ovato dein campanulato, subrepando, umbo-nato, lævi, sericio-fibrilloso, sicco, atro-cæruleo circa marginem pallidiore, 6—8 cm. diam.; lamellis latis, sinuato-adnexus, ventricosis, subdistantibus, carneis; stipite solido, ventricosus, glabro, pileo concolor basi albo, 5-7 cm. long; 1.5-2 cm. cras.; sporis oblongo-ellipticis, lævis, carneis, 10 + 4.5-5 μ ; cystidia cuspidata, ventricosa, 50-60 \times 12-15 μ .

A very beautiful fungus, and almost unique in colouring, being of a deep indigo-blue, becoming a little paler towards the margin, disc almost black when young and unexpanded. Taste mild; smell none.

Differs from all allies in the smooth elliptical spores. The fungus belongs to the section of *Entoloma* including *E. Bloxami*, *E. madidum*, and *E. ardosiacum*, the last-named being a doubtful British species.

Gregarious. Among short grass on 'The Terrace overlooking Rievaulx Abbey, Helmsley.' (Coll. J. Farrah, F.L.S., at the Y.N.U. Fungus Foray, 1903.)

Coprinus aquatilis Peck. Masee's 'Revision of the genus *Coprinus*,' Annals of Bot. X. (June 1896), pp. 123-184.

Among decaying leaves of *Luzula sylvatica*, moss, twigs, etc., in swamp, High Lee Clough, Norland, Halifax, June 1900.

Only previously recorded for New York State.

Hygrophorus melizeus Fries. Epicr., 321. Figs. 5-7 on plate.

Entirely pale straw-colour both outside and inside; gills with sometimes just a tinge of primrose. Pileus convex, becoming more or less depressed as it expands, even, viscid, flesh thin, 5-7 cm. across; gills rather deeply decurrent, thin, distant; stem, 6-8 cm. long, 1 cm. thick at the apex, narrowed downwards, apex with minute white squamules, stuffed; spores elliptic-oblong, apiculate, creamy-white, $10 \times 5 \mu$.

Allied to *H. eburneus*, for old discoloured specimens of which it has probably been mistaken in this country. Differs in the pale tinge of straw-colour of pileus, gills, and stem, and also of the flesh. Smell weak but pleasant.

Previous distribution, France, Switzerland, and Sweden.

On the ground among grass, near Rievaulx Abbey, Helmsley, Y.N.U. Fungus Foray, October 1903. (Coll. Messrs. Philip and Sheppard.)

Marasmius lagopinus Post, in Fries' Hym. Eur., 474. Figs. 8-10 on plate.

Pileus convex, then plane, even glabrous, pallid, 1-2 cm. across, flesh thin, gills adnate, slightly ventricose, straw-colour, somewhat crowded; stem short, 1-1.5 cm., slender, equal, whitish, the lower half with white spreading squamules, upper half glabrous; spores pale straw colour, subglobose, $3 \times 2 \mu$.

Gregarious, almost crowded. Springing from cracks on a wounded portion of a fallen branch, without any external appearance of mycelium, a habitat exactly similar to that described by Fries. Probably passed over as a form of *M. ramealis*, which differs in smaller size, depressed rugulose pileus, and rufescent, furfuraceous base of stem. Previously only recorded from Sweden.

Duncombe Park, Helmsley. Y.N.U. Fungus Foray, October 1903. (Coll. Messrs. Needham and Thwaites.)

Clavaria tenerrima Mass. et Crossl. (sp. nov.).

Gregaria subtenax farcta candida; clavis simplicibus cylindricis flexuosis apice subattenuatis; sporis hyalinis subglobosis apiculatis verrucosis, 8-9 μ .

Sporophores entirely shining white, gregarious but quite distinct at the base, cylindrical, smooth, apex slightly attenuated

but by no means acute, base not narrowed, 2.5-4 cm. high, 1.5-2 mm. thick.

Most closely allied, so far as general appearance goes, to *C. fragilis*, form B, of Fries, 'gracilior, cylindrica, subattenuata,' a form only known from the old figure in Sowerby's Fungi, tab. 232.

The present species is characterised by the slender, cylindrical, flexuous sporophore, and more especially by the subglobose, spores having the epispore densely covered with minute rounded warts. Basidia bearing four spores.

Among short grass, Halifax. (Coll. C. Crossland, No. 87.)

Venturia Thwaitesii Mass. et Crossl. (sp. nov.).

Peritheciis minutis (100-125 μ diam.), superficialibus, gregariis, tenuimembraneis, globulosis collabescentibus, pilis rigidulis, acutis, strictis, demum nigro-brunneis, 60-70 \times 3-3.5 μ ; ascis fusiformibus, 35-40 \times 6-7 μ ; sporis hyalinis, 1-septatis, subcylindricis, utrinque obtusiusculis retis vel leviter curvulis, 10-12 \times 2 μ .

A very interesting and distinct species, distinguished from allies by the minuteness of every part.

On dead stems of Wild Raspberry (*Rubus idæus*), Masham. (Coll. W. A. Thwaites, October 1901.)

Dilophospora albida Mass. et Crossl. (sp. nov.).

Peritheciis gregariis, subellipticis, gelatinosis, albo palle-scentibus, circa 1 mm. lat. et alt.; conidiis cylindricis, continuis hyalinis, utrinque obtusis, 30-40 \times 7-8 μ , infra apice setulam 3-6 filiformes gerentibus.

Peritheria as usual in this genus, rudimentary, gelatinous, collapsing and forming little discs with reddish-brown margins. Conidia with granular contents, sometimes slightly curved. From 3-5 hyaline bristles, sometimes slightly inflated at the base, spring from near the two ends of the conidium.

Differs from *D. graminis*, the only remaining British species, also from all other described forms, in the size of the conidia, and in the gelatinous, collapsing rudimentary perithecia.

On dead stems of *Epilobium hirsutum*, Lee Mill Road, Hebden Bridge. (Coll. J. Needham, August 1890.)

Gnomonia Needhami Mass. et Crossl. (sp. nov.).

Peritheciis sparsis, semiimmersis, subglobosis, bruneo-nigris, 350 μ diam., rostro longissimo, stricto, subcylindraco, apicem fimbriato, concolore, 1-1.5 mm. long.; ascis subovatis, 24-28 \times 12-16 μ ; sporis hyalinis, 1-septatis, ellipsoideis, 14 \times 22 \times 6-8 μ .

A very remarkable fungus, owing to the enormous development of the beak, or mouth of the perithecium, through which the spores escape into the air. The body of the beak consists of hyphæ arranged in a parallel manner, and these hyphæ become free from each other at the apex, spread apart, and form a fimbriated or fringed termination to the beak.

On dead fir leaves, Crimsworth Dean, Hebden Bridge. (Coll. J. Needham, May 1897.)

Calonectria vermispota Mass. et Crossl. (sp. nov.).

Peritheciis gregariis vel sparsis, globoso-conoideis, carneorufescentibus, cellulis rotundatis contextis, 0.5 mm. diam.; pilis hyalinis, brevibus, sparsis, vestitis; ascis mox evanidis; sporis elongato-fusoideis vel vermiformis, leniter sigmoideis, hyalinis, 12-24 septatis, 60-100 × 8-10 μ .

A very beautiful and distinct species, characterised by the large, many septate, worm-like spores. The spores occasionally break up into two equal parts. The scattered hairs on the perithecium average 80-100 × 8 μ at the thickened base, apex acute and rather opaque.

On a decorticated fallen trunk, Hardcastle. (Coll. J. Needham, November 1897.)

Peziza recedens Boud. Bull. Loc. Myc., France, 1898, p. 18, tab. V., fig. 1.

Ascophore subsessile, hemispherical then expanding, marginate and regularly but minutely denticulate, dark- or brownish-violet, paler and scurfy outside, disc becoming flat, centre often more or less umbilicate, 3-6 mm. diam.; asci cylindrical, only slightly narrowed at the base, apex deep blue with iodine, 8-spored, up to 300 × 18 μ ; spores, 1-seriate, elliptical, hyaline, smooth, 19-23 × 10-12 μ ; paraphyses stout, septate, apex pyriform and purplish, and up to 11-12 μ thick.

Superficially somewhat resembling *Humaria hepatica*, but differing in many essential features. Up to the present only observed in France.

On the cortex side of a tub-garth, partly lying in a stagnant pool, Halifax. (Coll. C. Crossland, No. 252, July 1892.)

Sphærospora citrina Mass. et Crossl. (sp. nov.).

Sessilis patellato-concava, majuscula, 5-8 mm. diam.; amœne lutea, circa marginem pilis brunneis erectis, e basi incrassata cuspidatis, 150-180 × 12-15 μ ornata; ascis cylindræis, stipitatis, 300 × 35 μ , paraphysibus bacillari-capitatis, septatis, flavidis obvallatis, octosporis; sporis monostichis, globosis, verrucosis, 30 μ diam., hyalinis.

The only species of *Sphærospora* having a clear yellow disc ; the spores are also larger than in any other known species.

On peaty ground, Redcar. (Coll. E. M. Holmes, F.L.S., September 1901.)

Dasyscypha læteor (Karst.) Sacc.

Ascophores gregarious or scattered, sessile, at first globose, finally expanded, disc plane, with raised or spreading margin, slightly fleshy, soft, 1.5 mm. across, disc dingy ochre, exterior brown below, pale ochre above, margin white, densely fringed with delicate, hyaline, cylindric-clavate, septate hairs in little fascicles, hairs $50-60 \times 4-6 \mu$, shortly and sparsely pilose below ; cortical cells oblong to globose, $8-10 \times 6-8 \mu$; marginal, $6 \times 4 \mu$. Asci cylindric-clavate, $50 \times 6.5-7 \mu$, apex narrowed. Spores 8, hyaline, obliquely biseriate, cylindric-fusiform, straight or curved, $12-15 \times 2-3 \mu$, 2-4 guttulate, smooth. Paraphyses sparse, septate, filiform, 2μ thick.

Karsten, in his latest description, says this differs from *D. bicolor* in the septate paraphyses, and thinner, closely septate hairs, and in growing only on *Rubus* species.

On dead wild raspberry canes, Midgehole, Hebden Bridge, May 1899. (Coll. J. Needham.) Masham, July 1902. (Coll. W. A. Thwaites.)

Mollisia livido-fusca (Fr.), Gillett. Disc. France, p. 127.

Peziza livido-fusca Fries, Syst. Myc., II., p. 147.

Ascophore sessile, attached by a central point, scattered, solitary or cæspitose, sometimes contorted through mutual pressure, open from the first, disc slightly concave, then plane, often undulate and lobed, honey colour then tinged pale red-brown, exterior reddish ochre, dark brown at the point of attachment, margin thin, even or wavy, 1.15 mm. across ; excipulum of densely interwoven, hyaline, septate hyphæ $3-5 \mu$ thick, passing at the cortex into globose, brownish cells, $10-14 \mu$ diam., slightly larger and darker towards base, paler and oblong $8-10 \times 6 \mu$, and in parallel rows towards the margin, at the extreme margin subclavate $3-4 \mu$ diam. Asci narrowly clavate, $80-90 \times 7$, apex rounded, pedicel stout, curved and swollen at the foot. Spores 8, when young biseriate above, uniseriate below filling the ascus ; when mature, in two rows in the upper part, hyaline, minutely biguttulate, elliptic-fusiform $10-13 \times 3-4 \mu$. Paraphyses slender, straight, hyaline 2μ thick.

The spores are shot from the asci very freely when examined in water. Some spores exhibit faint indications of a central septum. Tissue of ascophore soft and fragile.

On decayed decorticated wood, Crimsworth Dean, Hebden Bridge. (Coll. J. Needham, November 1898.)

Previous distribution, Sweden and Germany.

Coryne aquatica Mass. et Crossl. (sp. nov.).

Gregaria, carnosa-gelatinosa, obconica vel substipitata, plano-convexa, pallide lilacina, 4-10 mm. diam.; ascis cylindraceis ad basim subattenuatis, octosporis, $57-60 \times 6 \mu$; sporis monostichis hyalinis, 2-guttatis, ellipsoideo-oblongis, dein 2-3 septatis, $5-5.5 \times 3.5 \mu$; paraphysibus gracilibus.

A very distinct species, approaching nearest to *C. sarcoides* in general appearance, but differing widely in structure, spore measurement, and in aquatic habitat.

Gregarious, among moss on a boulder in a stream. The fungus was growing at the water-level when the stream was low, and must often have been submerged.

Egton Bridge, Y.N.U. Foray, September 1902. (Coll. G. Masee.)

Durella melanochlora Rehm., Ascom. Alp., No. 27.

Crowded or gregarious, sessile, superficial, slightly concave or almost plane, edge slightly raised, crenulate or rugulose, greenish, blackish when dry, up to 0.5 mm. diam.; asci clavate, obtuse, $60-90 \times 8-12 \mu$; 8-spored; spores biseriate, ovoid or subelongate, becoming 3-septate when quite mature, hyaline, $13-17 \times 5-6 \mu$; paraphyses slender.

On decorticated alder. Previously known from Germany, Switzerland, Italy, France, Lapland, and Finland.

Heptonstall. (Coll. Crossland and Needham, June 1899.)

Phoma caulographa Dur et Mont., Mont. Syll., No. 978.

Peritheccia circular or oblong, black, polished, superficial, globose then depressed and with a slight central umbo, gregarious; spores oblong, ends obtuse, hyaline with an oil-drop at each pole, $4-6 \times 2-2.5 \mu$.

On dead stems of *Cherophyllum temulentum*. Previously only recorded from Algeria and France, where it was growing on the same host.

Canal bank, near Elland. (Coll. H. T. Soppitt, January 1898.)

Symphosira parasitica Mass. et Crossl. (sp. nov.).

Gregaria vel solitaria; stipitibus pallidus, 6-14 mm. altis, compositis ex hyphis fasciculatis, sursum apice divergentibus

Naturalist,

et capitulum pulverulentum subsphæroideum efformantibus; conidiis cylindræis, 3-5 septatis, hyalinis, catenulatis, $40-70 \times 6-8 \mu$.

A very remarkable fungus, parasitic on the fallen mericarps of *Conium maculatum*. A single example was also found growing on the fruit of *Heracleum sphondylium*.

A considerable number of infested mericarps were collected and placed in damp earth covered by a bell-jar, where they remained till the following spring, when the fungus appeared in considerable quantities, one to three plants springing from a single hemlock fruit. The fungus presents the general appearance of a species of *Stilbum*, having a slender stem 1-1.5 cm. long, simple or rarely branched, the stem consists of a fascicle of hyphæ which separate from each other at the apex, the tip of each thread bearing a chain of septate, colourless conidia, these conidia collectively form a globose head, which becomes powdery as the chains of spores break up.

Numerous attempts were made at intervals throughout the season to trace the life-history of the fungus, by endeavouring to grow the spores in various media, but without success; not a single pure culture could be obtained, the spores sending out a few weakly germ-tubes, which gradually died without forming a mycelium.

During the following year the locality where the fungus was first discovered was revisited by A. Clarke and C. Crossland, and a second batch of material secured.

This was treated similarly to the first lot, and the following spring a fine growth was produced.

Remembering Woronin's statement that the ovary of *Vaccinium* was inoculated by a fungus called *Sclerotinia*, through spores being deposited on the stigma by insects, conidia of the *Symphosira* were deposited, by means of a fine needle, on the stigmas of *Conium maculatum*, *Heracleum sphondylium*, *Myrrhis odorata*, and *Epilobium salicifolium*.

In the case of the two last plants named, no inoculation was effected; in *Conium* nine out of twelve infected flowers produced the fungus in the ovary; whereas in *Heracleum* only two flowers out of twelve experimented upon produced the fungus. There is no shrivelling or distortion of the infected fruit, which looks quite normal in size and general appearance, but infected fruits appear to ripen much more quickly than normal uninfected ones do. If a section of a ripe infected mericarp is examined under the microscope its interior will be found to consist of a dense

mass of colourless interwoven hyphæ, forming a compact mycelium, enclosed in the unchanged testa of the mericarp. This sclerotium has been built up from the food originally intended by the plant for its own ovules.

Infected fruits at once fall when fully developed, and on the damp ground they produce the sporophores bearing mature conidia in about ten days.

Whether the conidia are deposited on the stigma by insects or through the agency of wind has not been determined, but infection of fresh flowers continues throughout the flowering season of the host-plant.

Infected fruits produced late in the season do not immediately produce conidia on falling to the ground, probably due to a decrease in the temperature, but remain in a passive state until the following season, when conidia are produced and inoculation of the hemlock flowers commences anew.

The parasitism of this fungus is evidently firmly established on *Conium* as a host-plant, as shown both from inoculation experiments and from the large quantity of specimens found on the fruit of this plant in a wild state. On the other hand, the very small percentage of successful inoculations resulting when *Heracleum* was used as a host, added to the fact that only a single *Heracleum* fruit was found bearing the fungus in a wild state, seems to indicate that the struggle for mastery between this plant and the fungus is keen.

It is somewhat remarkable that this fungus has not previously been observed anywhere, considering the comparative abundance of *Conium*. Only one other species of *Symphosira*, *S. lutea*, is known. This occurs in Germany, and is not a parasite.

Sutton, near Askern. (Coll. A. Clarke and C. Crossland, at the Sutton Y.N.U. Foray, September 1899.)

DESCRIPTION OF FIGURES ON PLATE.

Fig. 1.—*Entoloma Farrahi* Mass.&Crossl. A medium-sized specimen. Natural size.

„ 2.—Section of Fig. 1. Natural size.

„ 3.—Spores of same. $\times 400$.

„ 4.—Cystidium of same. $\times 400$.

„ 5.—*Hygrophorus melizeus* Fries. Natural size.

„ 6.—Section of same. Natural size.

„ 7.—Spores of same. $\times 400$.

„ 8.—*Marasmius lagopinus* Post. A group of plants. Natural size.

„ 9.—A plant of same. $\times 3$.

„ 10.—Spores of same. $\times 400$.

QUARTZITE PEBBLES ON THE YORKSHIRE WOLDS.

J. W. STATHER, F.G.S.,

Hull.

At a recent meeting of the Hull Geological Society (19th March 1903) a short paper with the above title was read by the present writer. In this paper it was pointed out that on large tracts of the Chalk Wolds of East Yorkshire, hitherto believed to be devoid of erratic materials, large numbers of quartzite pebbles occur, the geological history of which it is not easy to trace. As the facts have a wide bearing on the geological history of the district, it was thought a short preliminary account of them might not be uninteresting to the readers of 'The Naturalist.'

As is well known, the Yorkshire Wolds, composed in part of flinty, and in part of flintless Chalk, extend in the form of a rough crescent from Flamborough Head to the Humber. The general dip of the Chalk is to the south-east, swinging more to the east before it reaches the coast, and the general slope of the upland is in the same direction, so that the higher parts of the Chalk country are along the escarpments which overlook the Vale of York to the west and the Vale of Pickering to the north. To the south-east the Wolds sink gradually beneath the Glacial Drift which covers Holderness, and the surface of the Chalk in this quarter is considerably below sea-level.

It must be noted, however, that the glacial deposits so abundant in Holderness and the east coast generally, do not extend to the higher parts of the Chalk Wolds, and that, though the drift which covers their south-eastern flanks rises in some places to a considerable height, there is a large area of high land to the north and west entirely free from recognisable glacial deposits, and this area has been mapped as driftless by the officers of the Geological Survey.

But on these high-level areas, in spite of the absence of Glacial Drift, it has been found that quartzite pebbles occur in large numbers. The pebbles vary greatly in size, but probably their average diameter is from two to three inches. In colour they vary from a dull yellow to a yellowish red. They are well rounded, and in this respect resemble the Bunter pebbles so abundant in the Midland counties. These pebbles are also generally accompanied by pebbles of a hard, reddish sandstone, somewhat larger than the quartzites, but fewer in number and apparently not so waterworn. The scanty soil of the Wolds is

of course highly charged with fragments of chalk and flint, but the pebbles in question can be distinguished from this local material at a glance.

It has not yet been ascertained whether the pebbles occur over the whole of the western parts of the Wolds, but judging from the areas which have already been under observation, the general conditions of their occurrence seem to be as follows :—

(1) The pebbles occur at high levels, generally from 400 feet to 500 feet above sea-level, near the western escarpment of the Wolds.

(2) They are scattered unevenly over the fields, sometimes few and far between, at other times averaging as many as six pebbles to the square foot.

(3) The pebbles are rare on the sides of the dales, but are the most plentiful on the high-level flat lands which intervene between the dales; the rule being the flatter the land the more numerous the pebbles.

(4) They also occur, as the only foreign pebbles, in the Chalk gravels which underlie the boulder clay at Hessle, and they are also recorded from the old Chalk breccias, Fairy Stones, etc., of the higher Wolds.

In seeking for an explanation of the presence of these scattered pebbles on the high Chalk Wolds, it may be pointed out that (1) no local rocks occur in situ from which the pebbles can have been derived; that (2) the pebbles, being limited to quartzites and sandstones, cannot have come from the Glacial Drift to the east of the Wolds, because these drifts are famous for the immense variety of rocks represented amongst their boulders and pebbles; that (3), for similar reasons, neither can the pebbles be correlated with the gravels of the Vale of York.

In writing some time ago to ask the opinion of my friend, Mr. G. W. Lamplugh, with regard to these interesting strangers, I received in reply a letter, from which the following sentences are, with his permission, reproduced :—

‘I cannot even offer an opinion as to what your quartzite drift on the top of the Wolds may be. It may be well, however, to remind you of the ‘Lenham Beds’ of Pliocene age that occur in scraps on the North Downs. Relics of this kind might persist on the surface of the Wolds where protected from glaciation, even though a considerable thickness of the underlying Chalk had disappeared in solution. As the result of work in other places since leaving Yorkshire, I do not feel so confident that the Wolds remained ice-free throughout the Glacial period.

It is clear that they were not overswept by the ice at the time that the Speeton moraine was formed, nor at any later stage. But if evidence be found to indicate that they were covered at an earlier period, I should take it very carefully into consideration. Still, your materials scarcely suggest an ice covering, either from the west or east. You are working on interesting lines, and I advise you to continue.'

It would indeed be interesting if these quartzite pebbles should be the only surviving relics of some Pliocene, or, at any rate, pre-glacial, deposits hitherto unrecognised in Yorkshire. But at present the evidence is too slight to bear the weight of such a conclusion.

It may be remarked that in some high-level gravels of uncertain age in the south of England, beyond the limits of the Great Glaciation, quartzite pebbles also occur, and have given rise to much speculation.

SCAPANIA CALCICOLA: A NEW BRITISH HEPATIC.

WILLIAM INGHAM, B.A.,

York.

ON the 24th September 1897 I gathered a *Scapania*, interwoven with a moss, *Ditrichum flexicaule*, in Jackdaw Crag Quarry, Tadcaster. Both Mr. Macvicar and myself named it a 'curious form of *Scapania æquiloba*.' A dry habitat like a magnesian limestone quarry seemed a curious habitat for a member of the genus *Scapania*, which, perhaps more than all other hepatics, affects a wet and shady habitat.

In No. 6, the last number of the 'Revue Bryologique' for 1903, was a description of a new species of hepatic by Arnell and Persson, and, on reading this description, I immediately thought of my Jackdaw Crag Quarry plant, and identified it as the new species. I sent a specimen to Mr. Macvicar, who said it was quite likely to be *Scapania calcicola* Arnell & Persson. To settle the question, I sent a specimen to the author of the new species, Dr. Arnell, of Upsala, Sweden, and he has replied that my plant is quite right.

Scapania is known as a very difficult genus, and this new species, which seems to me distinct, will throw further light where light is so much needed. The following is my English

translation of the French description in the 'Revue Bryologique': 'Dioicous, laxly tufted or sparsely intermixed with other mosses, somewhat robust, almost of equal size with, and somewhat similar to *Scapania æquiloba*, 2 to 3 cm. high, rigid, shining, younger green to yellowish green, older brownish black, often paler coloured and shining at the apex. Stem simple or sparsely dichotomous, obscurely coloured, brownish-black; at the back, here and there, except on the highest part of the stem, bearing hyaline, long, smooth, and tufted radicles. Leaves somewhat dense, distichous, of equal size and equidistant, hardly papillose; *antical lobe* along the whole length of the suture acute-angular, and in the upper part reflexed, connate with the postical lobe, smaller by half, convex-rhomboidal, a little distant from the postical lobe, often apiculate, not passing across the stem, with entire margin, or sparsely dentate; *postical lobe* very often concave (rarely reflexed) obliquely ovate, round at the apex or very shortly acuminate, very rarely showing a minute apiculus, usually with entire margin, more rarely furnished with sparse teeth; *cells* roundish quadrate, in diameter about 0·02 mm., lower ones a little larger, in diameter 0·027 mm., with yellowish membrane, a little incrassate; *trigones* angular, distinct, containing 3 to 5 large granules; *cuticle* slightly papillose; *antheridia* two in axils of upper leaves; *male bracts* not different from other leaves, not saccate; *gonidia* arising on apical leaves, globular-oval, in diameter 0·027-0·033 mm., unibicellular, yellowish-green, membrane delicate; *female inflorescence* and fruit wanting.

HABITATS.—Sweden, prov. Uppland, in island Rumarö, on calcareous rocks with other limestone mosses as *Myurella julacea*, *Ditrichum flexicaule*, *Trichostomum tortuosum*, *Encalypta contorta*, *Pleuropus sericeus*, etc., by Arnell and Persson in 1903.

Yorkshire, in Jackdaw Crag Quarry, Tadcaster, mixed with *Ditrichum flexicaule*, and *Trichostomum tortuosum*, 24th September 1897, by W. Ingham.

HEPATICS.

Scapania aspera Müll & Bern.—This hepatic is frequent on shady limestone rocks and walls in the upper parts of the valleys of the Lune, Wharfe, and Aire, as at Malham, Cowside Beck Dale, Arneliffe, Kettlewell, Grassington, Ingleton, Clapham, etc. The specimens I gathered from some of these places above twenty years ago were passed as *S. æquiloba* by my then constant correspondent, the late H. Boswell. Mr. Macvicar states them to be true *S. aspera*.—W. WEST, Bradford.

THE YORKSHIRE BOULDER COMMITTEE AND ITS SEVENTEENTH YEAR'S WORK, 1902-1903.

PERCY F. KENDALL, F.G.S., *Chairman*,

AND

J. H. HOWARTH, F.G.S., *Hon. Secretary*.

THE Committee have this year to welcome a valuable addition to their ranks of workers in the Thirsk Naturalists' Club, which has organised a Sub-Committee to act in co-operation with this Committee. The first results of its investigations in the Vale of Mowbray are now presented. Mr. Kendall visited Thirsk this year and identified many boulders which will serve as types for the guidance of the local workers. A more thorough search of this area has long been needed, and the first report of the Thirsk Committee is interesting as furnishing what the Boulder Committee have long looked for, viz., evidence of the presence of rocks of Cheviot type in the Vale of York.

Commenting on the Thirsk records the British Association report on erratic blocks says:—'The observations made in the Vale of Mowbray may be said to close up the last gap in the network of observations which now extends over the whole of the great county of York from the Tees, on the north, to Sheffield, on the south, and from Ingleton, on the west, to the sea. The thoroughness with which the search for erratics has been made is very gratifying, yet the fact that fresh types of erratics still continue to be recorded shows that this well-worked field is far from being exhausted.'

Professor Brögger has identified in a specimen found by Messrs. Kendall and Muff at Stonegate, in Eskdale, another rock from the country around Christiania.

A further interesting find is that of the trachyte and dolerite of South-east Scotland by Mr. Kendall at Burstwick,* illustrating the value of last year's excursion to the Tweed Valley.

Much interest also attaches to the small boulder of Borrowdale Ash found by Mr. Gregory near Keighley at 950 O.D., which supports a previous record from Thornton-in-Craven.

Mr. Hemingway sends some valuable notes on the puzzling drift-area about Barnsley, and our East Riding friends continue with unabated zeal their invaluable work in their own area.

* See 'The Naturalist,' March 1903, p. 71.

HULL GEOLOGICAL SOCIETY.
REPORT OF BOULDER COMMITTEE.

Reported by W. CHADWICK.

THIRKLE BRIDGE, HOLDERNESS.

Dolerite, 36 in. \times 31 in. \times 32 in. Situated quarter-mile south of the bridge.

Reported by W. H. CROFTS.

HORNSEA.

Millstone Grit, 12 in. \times 9 in. \times 8 in.

Reported by P. F. KENDALL, F.G.S.

BURSTWICK.

Trachyte, similar to that of Eildon Hills, Melrose, N.B.
Dolerite, similar to those of Black Hills district, near Earlstown, N.B.

Quartz Porphyry.

BRIDLINGTON. On beach.

Trachyte, south of Scotland.

Reported by G. W. B. MACTURK.

LITTLE WIGHTON.

Chalky dry valley deposit, near Dannatt's chalk quarry, 300 ft. above sea level, containing pebbles of basalt, quartzite, and sandstone.

NEWBALD.

Basalt, 54 in. \times 36 in. \times 24 in. Situated on the roadside between Bushey Hill and Little Wood Plantation, about $2\frac{1}{2}$ miles east of Newbald, 372 ft. above sea level. Probably removed from the adjacent field.

Reported by THOS. SHEPPARD, F.G.S.

BROUGH.

In the boulder report for the year 1899 a record was made of a large boulder of Augite Syenite at the Mill Hill gravel quarry, Brough. This boulder has been transferred to the Hull Museum.

KELSEY HILL.

Carboniferous Limestone, 57 in. \times 41 in. \times 29 in. Found during excavation 15 ft. below the surface. This boulder is now at the Hull Museum.

ALDBOROUGH.

A large mammoth tooth weighing 11 lbs.

SAND-LE-MERE, HOLDERNESS.

Small mammoth tooth found on the beach.

Reported by J. W. STATHER, F.G.S.

HORNSEA.

Small boulder of Keuper Marl, showing pseudomorphs of crystals of common salt.

Reported by F. F. WALTON, F.G.S.

HORNSEA.

Coarse red granite, 42 in. \times 30 in. \times 24 in.

Augen gneiss, 24 in. \times 24 in. \times 20 in.

Dalbeatie granite, 12 in. \times 6 in. \times 5 in.

Reported by P. F. KENDALL, F.G.S., and H. B. MUFF, F.G.S.

STONEGATE, ESKDALE.

In railway cutting above Stonegate.

Syenitic dyke-rock.

Professor Brögger, of Christiania, has seen this specimen and writes to the Hon. Secretary:—

‘This rock is without any doubt originally transported from the Christiania region. It is a syenitic dyke-rock consisting of micro-perthite and Katophoritic hornblende with traces of riebeckite, further with titanite, magnetite, &c. Such dyke-rocks occur as well in the Longen Valley as north from Christiania, accompanying pulaskites and nordmardkites.’

EGTON BRIDGE, ESKDALE.

Gneiss granite, ‘probably Norwegian’ (Brögger).

Reported by H. BRANTWOOD MUFF, F.G.S.

LINTON, WHARFEDALE.

Silurian slate.

At the south end of the railway cutting, one-third of a mile W.S.W. of Linton, four large boulders of cleaved greenish Silurian slate in boulder clay.

The largest boulder is nearly 8 ft. long; another is striated from N.W. to S.E.

Reported by E. HAWKESWORTH.

FLAXBY, SOUTH OF BOROUGHBRIDGE.

In morainic ridge, Whin Sill.

WYKEHAM.

Whin Sill.

BROMPTON, NEAR NORTHALLERTON.

Andesite, Borrowdale Series.

WIGHILL, NEAR TADCASTER.

Whin Sill.

Reported by THE THIRSK NATURALISTS' CLUB,

per J. E. HALL, *Secretary.*

THIRSK.

In gravel pit, Gabbro (Carrock Fell), porphyrite (Cheviot type). Shap granite, Oolite (not local), Carboniferous conglomerate (Roman Fell type), granite.

UPSAL, WOOL MOOR.

725 ft. O.D.

Dolerite, millstone grit, black limestone.

UPSAL, HAG'S HILL.

225 ft. O.D.

Gabbro (Carrock Fell).

Granite (? Cheviot).

A. Very frequent throughout district.

Carboniferous limestone, black and encrinital.

Ganister.

Chert.

Millstone grit.

Dolerite.

B. Fairly frequent throughout district.

Andesitic breccia.

Cleaved andesitic breccia.

„ „ ash.

„ „ „ with epidote.

„ „ rhyolitic breccia.

„ „ agglomerates.

„ „ purple breccia.

Shap granite.

Vein quartz.

C. Occasional.

Cheviot porphyrite.

Carboniferous conglomerate.

Volcanic tuff (? Cheviot).

Gabbro (Carrock Fell).

REMARKS.

Dividing our district into three longitudinal strips roughly Codbeck (central), Swale (western), edge of Hambletons (eastern)—we find Class A pretty evenly distributed.

Class B very frequent in the central district, and only occasional in the E. and W.

Class C, so far as our research goes, are almost entirely confined to the central district.

THIRSK.

Gravel-pits.

Cheviot porphyrite, 3.

Carboniferous conglomerate, 4.

Shap granite, at least, 30.

REKHILL.

Gravel-pit.

Carboniferous conglomerate, 1.

Shap granite also found at Richmond, Swaledale, and Wemmergill, Lunedale.

Boulders reach their highest limit at about 700 ft.—725 on Wool Moor, above Upsal; 675 on Hood Hill, near Kilburn—and consist of dolerite, millstone grit, and black limestone.

Reported by W. HEMINGWAY.

CHURCH CARLTON, NEAR BARNSLEY. Found in cutting drain.

Micro-granite.

Mr. Hemingway writes :—‘There has been a considerable amount of draining done in this district (Barnsley) during the present year about Carlton and Royston, the most part of which has been in undisturbed boulder clay. The observations I have made confirm my opinion that the Scandinavian and Lancashire material found in the district has nothing whatever to do with the true glacial beds of the district, but that they have been carried here and distributed by subsequent agents. The rocks met with in the undisturbed beds are lavas and ashes of the Borrowdale series, porphyritic eurites of St. John’s Vale, undetermined rhyolites and diabases, also a single example of olivine-basalt. I have not detected as yet a single example of Eskdale or Ennerdale rocks, nor any of the characteristic east coast rocks, in the undisturbed beds recently exposed in the Carlton drains.’

Reported by J. H. HOWARTH, F.G.S., and W. SIMPSON, F.G.S.

EXTWHISTLE MOOR. In Rapes Clough, near Widdup Cross (Lancashire side), 1,200 O.D.

Silurian grit.

Reported by E. E. GREGORY.

SLIPPERY FORD. Four miles west of Keighley, 900 O.D.

Small boulder 6 ins. long, Borrowdale Ash, sheared.

Reported by T. SHEPPARD, F.G.S.

BOWES (NORTH YORKS.). In Village.

Shap granite, several boulders.

Reported by Rev. E. MAULE COLE, F.G.S.

WETWANG.

A number of small rounded quartz pebbles were dug up in my field (230 ft. above sea level) this year in making a grave for a donkey. The ground had never been disturbed. They were fast in a clayey matrix, but not boulder clay.

DESTRUCTIVE FUNGI IN WHARNCLIFFE WOODS.

THOMAS GIBBS.

Sheffield.

PERHAPS the most beautiful tree of our northern moorland woods is the Silver Birch. Whether in its early spring garb of pale yellow-green scattered among the as yet leafless Oaks, or in its graceful grey-green drapery of midsummer, or when in autumn it turns to golden brown, or even in winter when its shining white stems are a welcome relief in the dark woodlands, it is never without beauty. So to the lovers of sylvan scenery as well as to those to whom the woods appeal from their economic aspect it is regrettable to see serious destruction being caused to this beautiful tree from an entirely preventable cause. At the recent meeting of the Yorkshire Naturalists' Union in the Wharncliffe Woods the prevalence of that destructive tree parasite, *Polyporus betulinus* Fr., was a striking feature. In all directions were dead Birches studded right up the trunks with the white, hoof-shaped pilei of this fungus. Each of these dead trunks forms a centre of infection from which year after year myriads of minute spores are scattered in the air. Some of these alighting on a wounded surface of a living tree begin the work of destruction, the mycelium spreads in the living wood, and by the time the pilei make their appearance the disease is past cure. Nevertheless, as Mr. Massee points out in his 'Text Book of Plant Diseases,' although a cure is not possible in the individual case, much may be done to prevent the spread of the epidemic. Destroy every pileus as it appears; do not allow dead timber to stand or lie, also where practicable protect all wounded surfaces, such as broken or sawn branches. These precautions will greatly reduce the mischief.

SHORE COLLECTING AT WITHERNSEA, ETC.

T. PETCH, B.Sc., B.A.,

Hedon.

THE continuous rains of the last summer, though interfering with many projected excursions to the somewhat inaccessible shores of Holderness, indirectly proved of service in compelling attention to be given, if at all, to those localities which lie nearest to a railway station, and we have in consequence a number of unexpected records for Withernsea due to the abnormal condition of the shore at that place during the last year.

Normally the Holderness littoral consists of two well-defined regions: a sloping bank of sand and gravel, of a width depending on the force and direction of the last gale, which changes abruptly into an almost level stretch of firm wet sand with a few large boulders at long intervals at the foot of the shingle slope. Large shallow lagoons, known locally as 'gyles,' are formed occasionally on the level sand. But though the general character of the beach is constant, its condition at any given place is subject to perpetual variation: a single tide may obliterate the gyles, carry away or bury the boulders, and remove large quantities of shingle. Under these circumstances, zoophytes, worms, and mollusca found living on the beach from Bridlington to Spurn must be regarded as settlers of very precarious tenure; some of the smaller crustacea, not requiring a fixed habitation, are always present.

At Withernsea in 1903 a gyle extended southwards along the base of the shingle slope for nearly a mile. Large boulders covered the landward side and formed islands in the middle, whilst ridges of stones crossed it here and there and held up the water. The following species were found there on 25th July, those marked (*) being additions to the list given in the Transactions of the Hull Scientific and Field Naturalists' Club, Vol. III., pp. 37-41:—Crustacea—*Carcinus mænas* (Penn.), *Cancer pagurus* Linn., *Enpagurus bernhardus* (Linn.), *Hyas courcatus* Leach, *Stenothoe (Montagua) marina* (Spence Bate), **Calliope læviuscula* (Kroyer), *Gammarus marinus* Leach, *G. locusta* (Linn.), *Sphæroma rugicauda* Leach, *Sph. serratum* (Fabr.), *Idotea marina* Fabr., *Eurydice pulchra* Leach, **Limnoria lignorum* (Rathke). Anthozoa—*Tealia crassicornis* (Müll.), six specimens. Hydrozoa—*Tubularia indivisa* Linn.,

common; **Syncoryne eximia* Allman, one colony; **Coryne pusilla* Gaertner, several; *Obelia gelatinosa* (Pall.), abundant but small; **Sertularia filicula* E. and S., a well-grown colony covering a stone a foot in diameter; **Calycella syringa* (Linn.), on *Coryne*. Polyzoa—*Membranipora lacroixii* Hincks, abundant on stones; **M. flemingii* Busk, rare; *Mucronella peachii* (Johnst.), moderately common; **Bicellaria ciliata* (Linn.), small colonies on stones covered with *M. lacroixii*. Polychæta—**Lagisca floccosa* (Sav.), *Lanice conchilega* (Pall.). Mollusca—*Littorina littorea* (Linn.), *Purpura lapillus* (Linn.), *Gibbula cineraria* (Linn.), *Lacuna divaricata* (Fabr.), *Mytilus edulis* Linn., **Lamellidoris aspera* (A. & H.). Pisces—**Centronotus gunnellus*.

Lamellidoris aspera is recorded by Alder and Hancock as common at Whitby (Forbes and Hanley, Vol. III.). *Limnoria lignorum*, the gribble, is a well-known destroyer of submerged timber, and is described by Spence Bate and Westwood as 'one of the most destructive creatures to be found amongst the whole of the articulated animals.' They record that 'it was observed by Mr. Spence at Bridlington Bay, near Hull' (II., 354). It does not seem to have been observed in the Humber. In the present instance dozens were found in a piece of driftwood wedged between the boulders, and it was interesting to note how closely the terminal segment fitted the curve of the burrow, probably thereby preventing excessive loss of moisture when not submerged. *Tubularia indivisa* here had dwarfed stalks (about two inches), and larger heads than usual; *Obelia gelatinosa* was found on most of the stones, but the only large specimens grew in a miniature, alga-fringed rock-pool on the top of a boulder. On the dilapidated groynes at Withernsea were *Balanus balanoides* (Linn.), *Tubularia indivisa*, and a few mussels and periwinkles.

A visit to the skerries between Easington and Kilnsea on 27th July illustrated the changeable character of the shore. Most of the boulders and clay pools were hidden beneath the sand. In the few remaining pools several specimens of **Dendronotus frondosus* (Ascanius) were found amongst *Tubularia*, a habitat previously noted by Hincks (Brit. Hydroid Zoophytes, p. 117). *Phoxichilidium coccineum* (Johnst.) was moderately common, and a single specimen of another pycnogonid, near *Ammothoa*, was taken. As at Withernsea, *Lagisca floccosa*, *Centronotus gunnellus*, and *Idotea marina* were found, and in addition the crustacea, *Amathilla homari* (Fabr.), **Metopa alderi*

(Spence Bate), *Jæra albifrons* (Mont.). *Jæra nordmanni*, recorded for the Humber, should be *J. albifrons*. On the carapace of a large shore crab were living **Pomatoceros triqueter* (Linn.) *Obelia gelatinosa*, **Pedicellina gracilis* Sars, and *Membranipora dentata* Hincks. *Clytia johnstoni* (Alder) on red seaweed, **Grantia ciliata* Bowerbank on *Vesicularia*, and **Lichenopora hispida* (Fleming), *Bicellaria ciliata*, **Idmonea serpens* (Linn.), all on *Hydrallmania*, were abundant in the fishing boats.

Very little was done elsewhere. A mysis shrimp **Gasterosaccus spinifer* (Goës) was caught in a shallow pool at Aldborough on 9th August; the specimen was a female, with red spots at the edges of the carapace and a black line across the first segment of the pleon. Canon Norman (Ann. and Mag. Nat. Hist., Ser. 6, Vol. X., p. 154) records it from two English localities, Whitby, and Starcross, Devon.

On the Humber shore the discovery of *Clava squamata* (Müll) and *Polydora ciliata* (Johnst.) on and in timber at Paull brings these two species within four miles of Hull Pier. *Nymphon gracile* Leach, *Coryne van benedenii* Hincks, and *Farella repens* (Farre) were abundant in their former locality at Well Creek, the last two as before on *Tubularia*. *Farella repens* appears to be rare: Hincks states (Brit. Marine Polyzoa), 'We have only one or two British localities for the form *repens*.'

As great uncertainty exists amongst naturalists with regard to the nomenclature of several groups, I give below the sources of the names employed here, and in previous lists for Filey and the Humber district.

PORIFERA.	Bowerbank: Monograph of the British Spongiadæ: completed by Canon Norman.
HYDROZOA.	Hincks: British Hydroid Zoophytes.
ANTHOZOA.	Gosse: Actinologia Britannica.
POLYZOA.	Hincks: British Marine Polyzoa.
NEMERTINES.	McIntosh: Monograph British Annelids, Vol. I. Riches: Jour. Marine Biological Ass., N.S., Vol. III., pp. 1-29.
POLYCHÆTA.	McIntosh: Monograph British Annelids, Vol. 2, Part 1, and articles in Ann. and Mag. Nat. Hist. Cambridge Natural History; Worms.
MOLLUSCA.	List of British Marine Mollusca, Conch. Soc., 1902.
CRUSTACEA.	Bell: British Stalk-eyed Crustacea. Norman: British Schizopoda, Ann. and Mag. Nat. Hist., Ser. 6, Vol. IX. (1892) pp. 454-464; Vol. X. (1892), pp. 143-166, 242-263. Spence Bate and Westwood: British Sessile-eyed Crustacea.

A. O. Walker: Corrections of 'British Sessile-eyed Crustacea,' Ann. and Mag. Nat. Hist., Ser. 6, Vol. IX., pp. 134-138; Vol. XV., pp. 464, etc.

Norman: Notes on British Amphipoda, Ann. and Mag. Nat. Hist., Ser. 6, Vol. III., pp. 445-460; Vol. IV., pp. 113-141. Revision of British Amphipoda, Ann. and Mag. Nat. Hist., Ser. 7, Vol. V., pp. 126-144, 196-214, 326-346; Vol. VI., pp. 32-51.

PYCNOGONIDA. G. Johnston: Journal of Zoology and Botany, Vol. I., 1837, Edin.

G. Hodge: Ann. and Mag. Nat. Hist., Ser. 3, Vol. XIII. (1864), pp. 113, etc.

The list of references for the last group is too long for insertion. It is possible to trace a description (often inadequate) and in many cases a figure of each of the thirty-two species listed by Hodge, with the exception of *Nymphon pictum* for which he gives no authority; this seems to occur first in Gosse's list of 1855. In the light of recent discoveries, however, such an investigation is merely of antiquarian interest.

NOTES ON CHESHIRE PLANTS.

ARTHUR BENNETT, F.L.S.,
Croydon.

By the kindness of Prof. Johnson, of the Science and Art Museum, Dublin, through his assistant, Miss M. C. Knowles, I have been enabled to look through the *Potamogetons* and *Callitriches* of the late Lord de Tabley's herbarium.

CALLITRICHE VERNALIS Kütz. In his Flora he only gives one station. There are specimens of this from Dist. 7. Race Course, Knutsford, August 1869.

CALLITRICHE AUTUMNALIS L. An additional station for this is Rostherne Mere, H. Searle, sp., 1889.

There are several sheets of the plant he named *C. Lachii* (Ex. Club Rep. 18, 1875), though the specimens differ somewhat. Curiously enough it is not named in the Flora.

POTAMOGETON COLORATUS Horn. Dist. 4. Ditch in the Lang Fields, West Kirby, F. M. Webb, July 1873. This station is given in the Flora under *P. polygonifolius*, taken from 'App., Fl. Liverpool, 1873.' This is an interesting addition to the County Flora; it occurs in Salop!, across the Dee in Denbigh (Babington), rarely in Mid and South West York (Lees' Fl. W. York). The record for Leicester is noticed in the Flora of that county.

Naturalist,

POTAMOGETON ANGUSTIFOLIUS Bertch & Presl. (*P. Zizii*). Dist. 2. Rostherne Mere. Lord de Tabley sp. in herb! (as *lucens*) is another addition to the county. There is no date to these specimens, and they are the only ones I have seen from Cheshire.

POTAMOGETON FRIESII Rupr. (*P. mucronatus* Schrad.). It is odd that under the name of *compressus* Smith (which is *P. Friesii* of Smith's herbarium) the author remarks, 'I do not give it as belonging to the county,' yet under *P. mucronatus* he names a locality and says that D. Syme passed it as that plant. No doubt this may be explained by the fact that the one was written after the other and never revised. A few other notes add to the account given of the species.

STELLARIA NEGLECTA Weihe (as *S. umbrosa* Opiz.). Morley Wood, near Moberley, J. Britten, J. of Botany, 245, 1871.

SAXIFRAGA HIRCULUS L. 'Still exists on Knutsford Moor, but is almost destroyed by the rapacity of some individuals who have dug it up for sale in the most remorseless manner,' Dr. J. B. Wood, Phyt. 1, 282, 1842. A later and more definite date than in the Flora.

STATICE 'AURICULÆFOLIA Vahl.' Still on Hilbre Island in 1873, R. Brown, sp. in the form *intermedia* of Syme.

SCHEUCHZERIA PALUSTRIS L. It is probable that Cheshire is the only county in which this now exists, as I fear Mr. Beckwith's Salopian station has it no longer.

POLYGONATUM MULTIFLORUM All. Bolesworth, July 1859, A. Croall sp.

NATURE STUDY IN EAST YORKSHIRE.

ON Saturday, 21st November, the East Riding Nature Study Committee held a very successful exhibition of natural history objects, etc., in the Assembly Rooms, Beverley. It was largely attended by teachers and school managers from all parts of the district. Examples of the work done in some of the East Yorkshire schools were on view, as well as an excellent series of exhibits from the Leeds and Liverpool schools which had been lent for the occasion. The Hull Scientific and Field Naturalists' Club had collections of flowering plants, ferns and mosses, sea-weeds, photographs, geological specimens, etc., and a few cases showing the life history of insects were lent

from the Hull Museum. Various objects supplied to schools in connection with Nature study were got together from all parts of the country and exhibited by Messrs. A. Brown & Sons. This exhibit alone illustrated the great strides made in Nature study in recent years. The exhibition was opened by Mr. L. T. Monro, H.M. Inspector of Schools.

In the morning a large room was well filled with teachers, who took part in a discussion following the reading of a paper by Mr. Branson on 'Nature Study, its co-ordination with ordinary class subjects, and the equipment of the teacher.' This conference proved most helpful to the teachers in their work, and it was evident that the study of Nature was taking an important place in the curriculum of the East Riding schools.

The Secretaries, the Rev. R. G. Pyne and Mr. J. E. Bartlett, presented a report on the year's work, of which the following is a summary :—

At a meeting held at Beverley on Saturday, 22nd November 1902, Lord Herries in the chair, a committee was appointed to take steps for the furtherance of Nature study in the East Riding.

The following programme of field excursions was agreed to :—23rd May, with the Hull Field Naturalists to Hornsea Mere; 1st June, with the Yorkshire Naturalists' Union to Filey; 20th June, Wheldrake Bee Farm, conducted by the Rev. S. Smith; 4th July, Skipwith Common, conducted by Mr. J. F. Robinson; 11th July, Driffeld Museum, Kingsmill and Elmswell, conducted by Mr. T. Sheppard, F.G.S. The gentlemen mentioned very kindly placed their services at the disposal of the committee. Invitations were issued to all the elementary schools in the East Riding, and the excursions were duly carried out. They were much appreciated, each excursion being well attended and forming an opportunity not only for Nature study but in addition for a pleasant reunion. They were arranged for different parts of the Riding, so as to give the more opportunity for teachers to avail themselves of them.

On Friday, 9th October, the children of the upper standards attending the schools at Driffeld and Hutton Cranswick visited the Driffeld Museum, by permission of Mr. J. R. Mortimer. They were conducted round by Mr. Sheppard and were greatly interested in what they saw and heard.

On 10th October, teachers from various parts of the Riding met at the Hull Museum, and were conducted round by the curator. The visit was much appreciated.

HOST PLANTS OF BROOM RAPES.

ARTHUR BENNETT, F.L.S.,

Croydon.

WITH respect to the British species of the genus *Orobanche*, it may be well to put on record the plants on which they have been found.

OROBANCHE RUBRA Sm. is recorded principally on *Thymus*, by Mr. A. G. More on *Festuca rubra*, and by Dr. G. Beck on *Clinopodium vulgare*, *Origanum vulgare*, and *Prunella vulgaris*.

OROBANCHE CARYOPHYLLACEA Sm. On *Galium mollugo*!, *Aparine, boreale, erectum*, and *verum*!; *Lotus corniculatus*!, *Rubus fruticosus* (Syme), and Beck gives *Achillea millefolia*, *Ligustrum*, *Lychnis dioica*, etc.

OROBANCHE ELATOIR Sutton. On *Carduus crispus*!, *Knautia arvensis*!, *Centaurea nigra* and *Scabiosa*!, and Beck gives *Onobrychis sativa*.

OROBANCHE PICRIDIS F.W.Schultz. On *Picris*! and *Daucus Carota*!

OROBANCHE HEDERÆ Duby. On *Hedera Helix*!

OROBANCHE AMETHYSTEA Thuil. *Daucus Carota*!, *Ononis arvensis*!, *Eryngium maritimum* (Syme), *Plantago Coronopus* (Waterfall), and Beck adds *Euonymus europæus*.

OROBANCHE MINOR Sutton. On *Crepis virens*!, *Trifolium repens*!, *pratense*!, *Ononis arvensis*!, *Lotus corniculatus*!, *Nepeta Glechoma*!, *Carduus crispus*!, *C. nutans* (Henslow), *C. palustris* and *lanceolatus* (Webster), *Plantago Coronopus* (Bromfield), *Picris* (Watson), *Eryngium* (Druce), *Digitalis*!, *Leontodon autumnalis*!, and 14 other species are given by Beck in his Monograph.

OROBANCHE MAJOR Sm. non. L. According to Dr. Beck *O. major* Smith = *O. Rapum Genistæ* Thuill, and *O. major* L. is *O. elatior* Sutton.

OROBANCHE RAPUM GENISTÆ Thuill. *Sarothamnus vulgaris*!, *Ulex europæus*!, *Genista tinctoria*, and *Erica cinerea*.

OROBANCHE PURPUREA Jacq. (*O. caerulea* Vill.). On *Achillea millefolium*!, and Beck adds *Artemisia campestris* and *vulgaris*, *Cirsium acaule*.

I certainly do not think our list of British species is yet complete. I have two or three in my herbarium that I believe are new sp. to Britain, but dried they are very difficult to determine.

REVIEWS AND BOOK NOTICES.

Flora of Derbyshire. By the **Rev. William Richardson Linton.** With two Maps. London, Bemrose & Sons, Ltd., 1903.

‘The project of producing a Flora of Derbyshire is so far accomplished that it seems desirable at length to publish results, though, no doubt, further investigations will yield many data of interest. The present work, accordingly, cannot be regarded as much more than a stage forward towards a complete account of the botany of the county.’ These, the opening sentences of the preface, are almost the review of the book. The skeleton of a county Flora—the list of plants known in Derbyshire, with localities, period of flowering, and the other items usually mentioned in a county Flora—is here; and it is a record which will go down to posterity with probably few changes. The life which is to make the dry bones live, however, is not yet present. Some attempt has been made, by means of introductory pages and maps, to cover the skeleton with a flimsy garment, which it is to be hoped will some day be replaced by more substantial clothing. In short, the Flora of Derbyshire is an example of the usual type of a British County Flora. The aid of botanists in the county has been fully utilised to make the list of species and records as complete as possible, and specialists have assisted in difficult identifications. The known plants of Derbyshire are carefully recorded, and field botanists will find the book a trustworthy guide to species of flowering plants, ferns, and muscineæ. The mosses and hepatics appear to be more fully dealt with than is usually the case in county Floras. The records of localities of all the plants are numerous, and will certainly assist local botanists. The range of altitude of the species is hardly ever given, so that botanists unfamiliar with Derbyshire will derive little assistance in studies which require the altitudinal range of British plants. The author is also too free with his use of the term ‘native.’ It seems to us rather presumptuous to give the class of citizenship of every plant in a county, unless some special attention has been paid to this aspect of field botany. In the case of the Flora under notice the author seems to have been quite content to repeat the terms used in British Floras, and we miss critical remarks on the class of citizenship of *Derbyshire* as opposed to *British* plants. Thus the records—the strongest feature of the Flora—are not calculated to assist workers in the distribution of plants in Britain as a whole, or in Europe.

The introductory chapters and maps have no connection (except that given by the bookbinder) with the body of the Flora; and one cannot but think that they are finishing touches thrown in on 'varnishing day.' A concise summary of the rainfall by an able specialist is ignored in the rest of the book, even in the chapter on climate and species. Ten pages are devoted to soils and species; and this chapter with the two maps appears to form the basis of the 'botanical divisions' of the county. The author considers it 'unnecessary to describe the boundaries of the divisions, as they are sufficiently indicated on the map.' We cannot find any boundaries on the map, and endless confusion will arise in the field if these divisions are used. Botanical divisions cannot be founded on a geological rock-map, because the soil (which is the place where the plants grow) is too often not the product of the underlying rock. The neglect of peat and other surface deposits has led the author himself into many pitfalls. As a case in point, a list of species said to be typical of the Millstone Grit is given (pp. 14-15), and of these certain are said to be 'peculiar to it.' As a matter of fact, many are neither typical of, nor peculiar to, Millstone Grit. They are peat-loving plants, and grow on peat, no matter whether the underlying rock be Millstone Grit, as in Derbyshire, or Mountain Limestone, as in Ireland, or Keuper Marls, as in Somerset. This, indeed, is a serious blemish. The inclusion of the so-called 'Yoredales' with the Mountain Limestone in a 'botanical division' is unsound, as the plants of the 'Yoredales' of Derbyshire are identical with those on the Millstone Grit shales. It would have been much more useful to have included the Permian with the Mountain Limestone, since the differences between them are chiefly due to the lower altitude and lower rainfall of the former as compared with the latter.

The lists of species given as peculiar to the different rocks, which fill four pages, are therefore unreliable, and in some cases even contradicted by the localities quoted. The maps of Derbyshire are not very helpful to botanists. Even altitudes are not marked. If a vegetation map is not available, we suggest a coloured half-inch-to-mile orographical map, reduced from the Ordnance Survey maps, and issued by several publishers, as more practical than a road map. The best pages of the Flora are those on the extinct plants of the county, and on unrecorded plants whose occurrence in neighbouring vice-counties suggests their possible occurrence in Derbyshire. The literature relating to the field botany of the county from 1640 is a very useful

record, and must have occupied a great deal of time in compilation. The mode of reference, however, is cumbrous. Thus 'Baker, J. B.' signifies Mr. J. G. Baker's paper in the 'Journal of Botany,' and twenty pages have to be searched—sometimes without result, as we have found. 'The Naturalist' is perhaps the greatest sufferer by this stilted and cumbersome method of reference; and only enthusiastic students will benefit greatly by the author's extensive bibliographical notes.

In the future the botanists of Derbyshire may profitably relax their vigilance with regard to new and rare species, and we hope they will find time to study the vegetation of the area on the lines of H. C. Watson, J. G. Baker, F. A. Lees, W. B. Crump, and others, so that in time it will be possible to frame a more 'complete account of the botany of the county.'

S. & M.



SCIENCE IN HULL IN 1903.*

The Hull Scientific and Field Naturalists' Club are once more to be felicitated and complimented on their scientific work and the promptitude and completeness with which it is brought before the public eye, and the volume now before us includes numerous papers and notes of much value.

The longest paper is one which can hardly be regarded as scientific at all. It is one by Mr. Thos. Blashill, F.R.I.B.A., modestly entitled 'Evidences relating to East Hull,' a mass of detailed information on the historical topography of that part of the town.

The most important paper in the volume is, in our opinion, the scholarly contribution in which Mr. T. Petch, under the title of 'The Marine Fauna of the Humber District and the Holderness Coast,' sums up what is known of marine zoology in the district and enumerates the species which have been found to occur. It were much to be wished in this connection that naturalists in Yorkshire would take up with vigour and enthusiasm the study of the living organisms of their coastline, and render the work of the Marine Biology Committee of the Yorkshire Naturalists' Union more of a reality than ever it has been, and that Mr. Petch's paper may prove an effectual stimulus thereto is a consummation devoutly to be hoped for.

*Transactions of the Hull Scientific and Field Naturalists' Club for the year 1903, Vol. III., No. 1, 120 pp., with 11 plates and numerous illustrations in the text. Price 3s. 6d. net. Hull, A. Brown & Sons.

Besides various interesting short notes of occurrences used to fill up otherwise blank pages, there are papers by Mr. J. F. Robinson giving Addenda to the Flora of the East Riding; an interesting note by Rev. E. P. Blackburn on the Dispersal of Shells by Beetles; a note on Additions to the List of the Diatomaceæ of the Hull District by Mr. R. H. Philip, with a plate of drawings of the new records for the district; and a valuable Third List of East Yorkshire Coleoptera, in which Mr. T. Stainforth and Mr. H. E. Johnson give full details for a large number of species not included in the previous lists. There is also a Preliminary List of Micro-lepidoptera occurring within eight miles of Hull, by Mr. J. W. Boulton, but as it is but a bare list of names with no information whatever, it would have been a wiser plan to delay its publication until full details of habitat, date of appearance, etc., were given.

Typographically the work is capable of improvement. The double column arrangement of the list of beetles and the too frequent use of contractions of place-names is not only inartistic in appearance but confusing to the eye, which the use of a thick letter for species names and of lines extending across the page would immensely improve. In this respect Mr. Robinson's paper is a healthy contrast.

The opening paper is a reprint of a pamphlet by Mr. Wade, which appeared at the beginning of the year and was reviewed in this journal for March.

The summaries of the last two annual reports which are given at the end of the volume furnish further evidence of the zeal and knowledge and discretion which characterise the work of our Hull friends, who are to be congratulated, and their indefatigable honorary secretary, Mr. T. Sheppard, in particular, on the completion of another year's most excellent work.

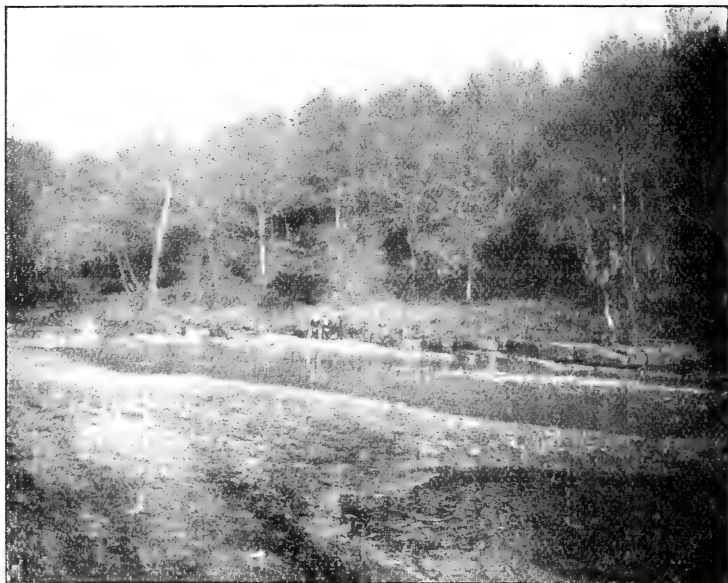
R.



The first Report of the Advisory Committee of the City of Bradford Botanical Garden (Lister Park) has just been issued, and contains an account of the formation and progress of the garden. Already over 400 species of plants have been placed in the garden and properly labelled. As far as possible the beds are arranged according to the natural orders. The Bradford Botanical Garden, opened in April last, has evidently come to stay, and the pity is that more towns and cities are not able to follow the example of Bradford.

‘Notes on the History, Ornithology, Entomology, and Botany of the Vale of Derwent.’ Under the above title the Vale of Derwent Naturalists' Field Club issues its fourth volume of Transactions, an attractive-looking publication, neatly got up and well illustrated. The plates illustrate the beautiful district in which the Club is situated, one of the illustrations from which is here reproduced by the kindness of the Club.

Some of the articles dealing with more general topics might well have been condensed, and the time-worn blocks in illustration omitted—though possibly they are inserted with the view of popularising Natural History amongst the members. The Rev. W. Featherstonhaugh contributes a valuable account of the local ‘Strangers Botanical in Derwent Vale,’ Mr. T. Robson writes on the ‘Fauna of the Derwent Valley,’ which, however, deals with



Scene on the River Derwent.

mammals and birds only; and the same author's notes on the ‘Migration of Birds’ contain local records of value. Well-illustrated historical papers by Mr. H. F. Bulman also appear, and Mr. G. Ord and Mr. R. Robinson add notes. Altogether the volume is an interesting and valuable production. It can be obtained from Andrew Reid & Co., Newcastle, for 2s. 6d.

NORTHERN NEWS.

A polecat was shot at Darley, in Nidderdale, on 30th October, after it had played considerable havoc with some poultry.

In the November Journal of the Queckett Club Mr. J. D. Scourfield gives Part 2 (Copepoda) of a synopsis of the known species of British Fresh-water Entomostraca, in which occur Lake District, etc., records.

Naturalist,

FIELD NOTES.

MAMMALS.

Occurrence of the Black Rat (*Mus rattus*) at Middlesbrough, Yorkshire.—Some few months ago at one of the meetings held by the Cleveland Naturalists' Field Club, a case of Black Rats (*Mus rattus*) was exhibited, the specimens having been taken at Stockton-on-Tees, in the county of Durham, where the species seems to occur frequently in the old warehouses and buildings in the vicinity of the river Tees. The above exhibit led to one of our members remarking to me, when seeing him a short time since at his works at Middlesbrough, that his workmen had been trapping rats for some time, and noticing they were very dark coloured, it occurred to him that they might be the Black Rat. I asked him to send me the next one that was caught, the result being that he sent me a specimen on 11th November last, and it turned out to be, as he surmised, a specimen of the Black Rat (*M. rattus*). It had been slightly damaged in trapping. This is a rather interesting occurrence, especially seeing that Middlesbrough is altogether a modern town, and has practically none of the old warehouses and buildings which this species is said to frequent, our oldest buildings, with one or two exceptions, only dating back a matter of 60 or 70 years. A local taxidermist informs me that on two occasions within the past few years he has had Middlesbrough specimens. It is possibly a species that is very much overlooked, and is probably of very much commoner occurrence than is generally credited.—T. ASHTON LOFTHOUSE, The Croft, Linthorpe, Middlesbrough, 3rd December 1903.

[This species is not at all uncommon in some of the warehouses at Hull.—EDS.]

BIRDS.

Kingfisher at Wirksworth, Derbyshire.—A few days ago my father observed a specimen of the Kingfisher (*Alcedo ispida* L.) flying over a small artificial pond which occupies a hollow at the bottom of his kitchen garden at Wirksworth. The beautiful visitor had evidently spotted the little piece of water in the course of a foraging expedition. The most likely permanent habitat in the neighbourhood is the Derwent, about two miles to the east, but there are also nearer the little Ecclesbourne brook and a few fair-sized ponds in woods and parks in the immediate neighbourhood.—THOS. GIBBS, 197, Cemetery Road, Sheffield, 13th December 1903.

FISHES.

Large Eel Migrating.—On Saturday, 17th October 1903, at Wispington, near Horncastle, an Eel was found killed by cattle treading upon it, on a rising ground some distance from a large pond, which it had evidently left during the night. It measured 3 ft. 1 in. in length, $6\frac{1}{2}$ in. in girth, and weighed 3 lb. 1 oz. It was apparently migrating. An old man, named Oldfield, formerly residing in my parish, has stated that he has seen Eels travelling over the fields in the dew of the morning 'in droves.' In the instance here given the nearest river, the Witham, is between five and six miles distant.—J. CONWAY WALTER, Langton Rectory, Horncastle.

MOLLUSCS.

***Arion ater* var. *albolateralis* Roeb. in North Lancs.**—On 30th August last an *Arion* was brought to me which Mr. Roebuck pronounced to be his variety *albolateralis*. It was found on the roadside between Arrad Foot Post Office and Greenodd. Mr. Roebuck told me the variety had been twice previously found in V.C. 69, and it seems each was in the Lancashire portion: one near Hawkshead and one at Coniston; so that mine from the coast area fills a gap for Low Furness.—S. L. PETTY, Ulverston, 12th December 1903.

LEPIDOPTERA.

***Melanargia galatea* on the Yorkshire Wolds.**—I record the re-occurrence of *Melanargia galatea* this year in the Yorkshire Wolds. It is well established in the same spot as last year, and has been so no doubt for ages.—REGINALD H. BARKER, Grosvenor Bank, Scarborough, November 1903.

FERNS.

***Asplenium adiantum-nigrum* in East Yorkshire.**—In 'The Flora of East Yorkshire' Mr. Robinson gives only one locality (Easington) for the Black Spleenwort. I am glad to be able to add another in a very different district. Many years ago I found it growing rather luxuriantly in a lane near the village of Bempton. It is only too probable that it has since been exterminated. It still lingers in Forge Valley. I was gazing at a specimen yesterday. This of course is in the North Riding.—W. M. C. HEY, West Ayton.

Naturalist,

JUST ISSUED.

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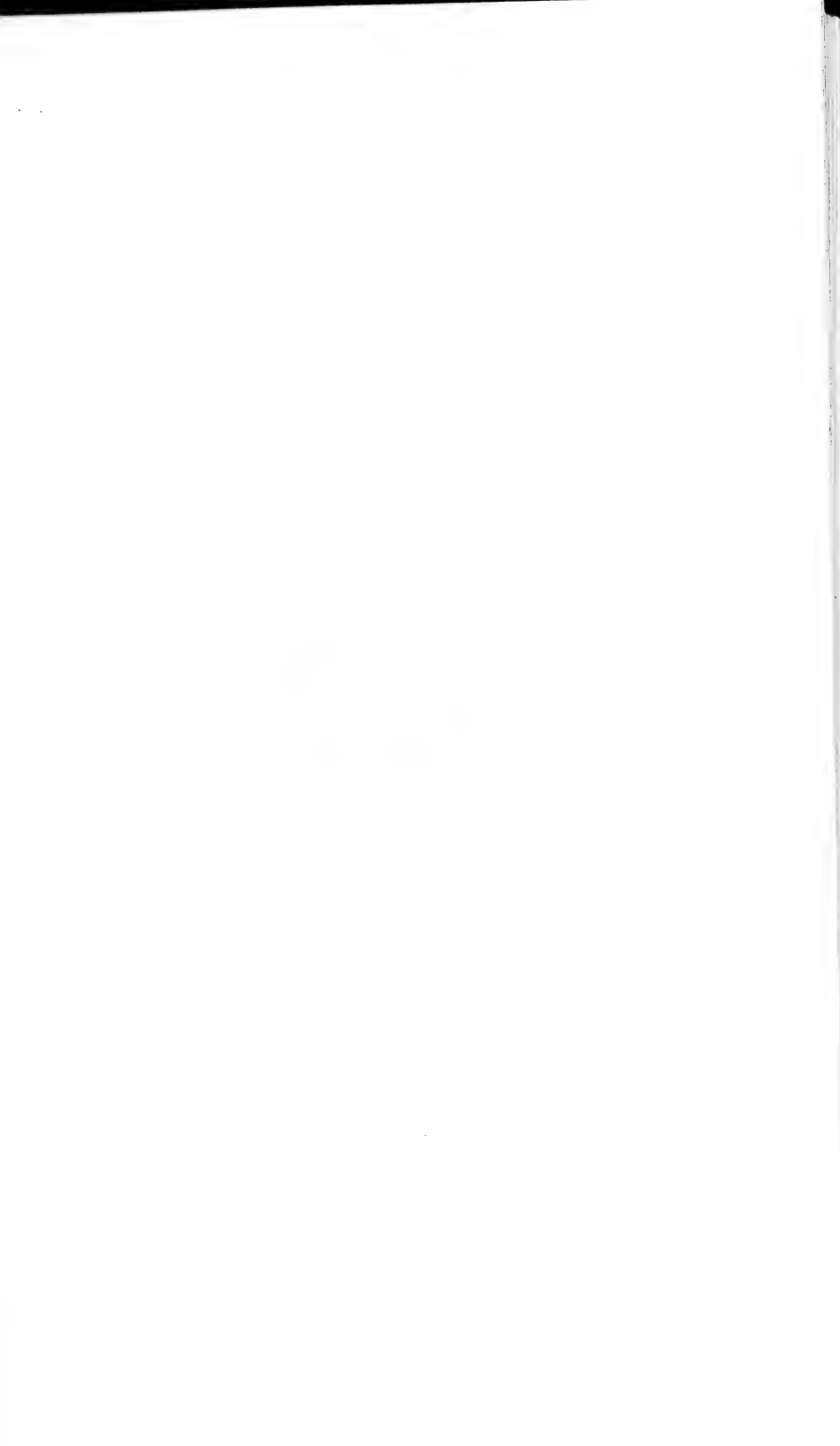
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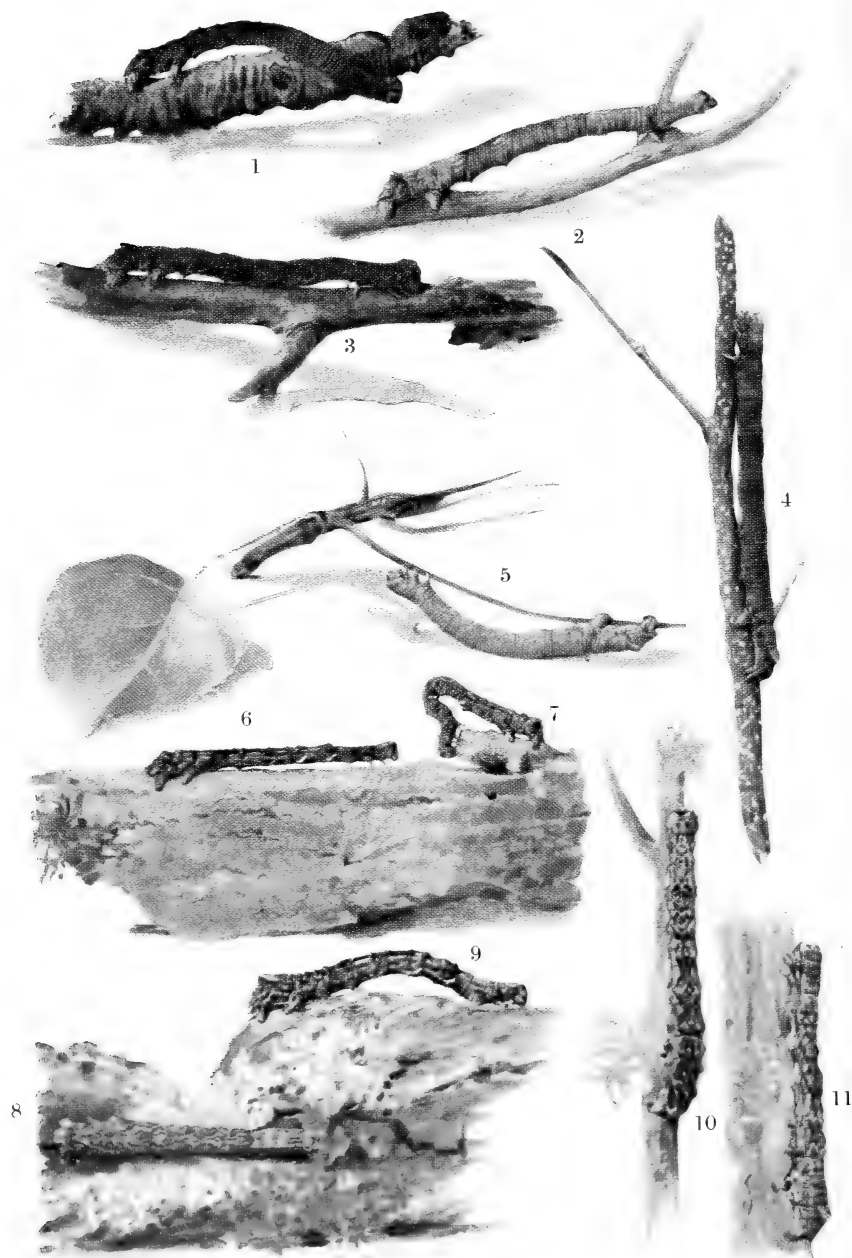
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Results of Experiments upon the Colour-relation between the larvæ of *Odontopera bidentata* and their environment.

NOTES AND COMMENTS.

ENTOMOLOGY *v.* 'COLLECTING.'

Too often is it found that an 'entomologist' is no more entitled to that designation than if he were a collector of the scores of odds and ends that all school boys are heir to. A collection of insects is, of course, necessary for purposes of study, without which few genuine entomologists would exist. But there are many different ways of collecting—mostly wrong ways. In the very earliest stages of obtaining specimens their true scientific value and purpose should be impressed upon the young (or old) collector. His goal should not be to secure still another addition to his cabinet, and nothing more. The man who has the greatest collection of butterflies, moths, or beetles is by no means necessarily the best entomologist. Rather is it he who studies the life-histories of the specimens, their adaptation to their surroundings, their variation in size and colour, their varying dates of appearance, and the causes thereof.

EVILS OF INJUDICIOUS COLLECTING.

Nowadays it frequently happens that too much collecting is done, and, in some known Yorkshire instances, even almost to the extermination of rare species from their habitats. The system of exchange is largely responsible for this, when the collector, having obtained sufficient for his own needs, secures, in some cases, *hundreds* of 'duplicates,' in order to add to his collection by their trade. More than one case is on record when most promising entomologists have slowly but surely 'evolved' into nothing more nor less than dealers as a result of their trafficking. The foregoing remarks are made in no sense to discourage the pursuit of entomology. The mere existence of a collection, if the specimens are properly labelled and localised, is of use to those interested in the distribution of our fauna. Examination of old collections has frequently added most valuable information relative to the former occurrences of certain species in certain areas. But it is sincerely urged that the 'why' and the 'wherefore' should receive first attention, and the number of drawers in the cabinet be a matter of minor importance.

EXPERIMENTS WITH LARVÆ.

As an illustration of one of the many ways in which entomologists might make valuable scientific observations, and contribute something really substantial to our knowledge,

reference might be made to the experiments which have been conducted for many years by Professor E. B. Poulton, F.R.S., President of the Entomological Society of London. An instalment of the Professor's work appears in the 'Transactions of the Entomological Society for 1903' (Part 3), recently issued, and is descriptive of his experiments upon the colour-relation between lepidopterous larvæ and their surroundings, and especially the effect of lichen-covered bark upon *Odontopera bidentata*, *Gastropacha quercifolia*, *Amphidasis betularia*, etc.

COLOUR CHANGES BY ENVIRONMENT.

Professor Poulton's experiments were made with a view to ascertaining what degree of sensitiveness larvæ possessed in adapting themselves to their food environments, for purposes of protection. They show that, although probably the great majority of tree- and plant-feeding larvæ are more or less sensitive (some larvæ are equally well protected by altogether different methods), all species are not influenced by their surroundings in the same degree, and even equally strongly sensitive species are not always influenced in the same way by similar surroundings. *Odontopera bidentata* and *Amphidasis betularia*, for instance, though forming some of the best subjects for the experiments yet tried, differ considerably in that respect, as it is found that the larvæ of *bidentata* are much more sensitive to the imitation of lichens than to green leaves, whereas in *betularia* just the reverse is the case. These and numerous other important observations are to be found in Professor Poulton's valuable paper, to which reference should be made by all entomologists and students of evolution.

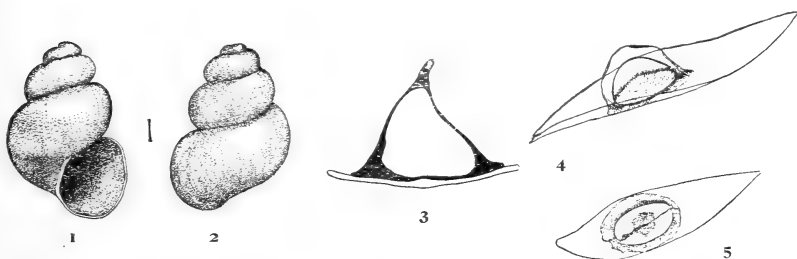
OUR PLATE.

The article referred to is illustrated by two excellent coloured plates, one of which representing larvæ of *Odontopera bidentata*, we are able to reproduce, through the courtesy of the author and the Council of the Entomological Society of London. Plate II., Figs. 6 and 7, represent half-grown larvæ; all the others are nearly mature specimens. Fig. 1 shows the effect of a larva of *Odontopera bidentata* on black-barked twigs (*Quercus cerris*). Fig. 2 shows the effect of an environment of weathered, pale grey, barkless twigs. Fig. 3 shows the effect of an environment of dark, purplish-brown, glossy twigs, probably of birch. Fig. 4, larva on white-spotted, purplish-

brown twigs of birch. Fig. 5, larva on green leaves and shoots of *Populus nigra*. Figs. 6, 7, and 11, larvæ on bark covered with bluish-green lichen, probably *Physcia pulverulenta*. Figs. 8 and 9, larvæ showing the effect of an environment of bark covered with orange lichen, perhaps *Physcia parietina* combined with *P. pulverulenta*. Fig. 10, larva showing effect of environment of lichen-covered sticks. All the larvæ figured on this plate were from Yorkshire eggs, obtained from moths captured at Huddersfield and Sledmere by Mr. G. T. Porritt, who gave them to Prof. Poulton for the purposes of his experiments.

HABITS OF *PALUDESTRINA TAYLORI*.

Paludestrina taylori was first discovered in 1900 in the canal near Fairfield Locks, Droylsden, Lancashire, associated with *P. jenkinsi*, of which species it was at first thought to be a variety. Later in the same year it was taken in a short arm of the Peak Forest Canal at Dukinfield, Cheshire. Messrs. J. W. Jackson and F. Taylor have recently been studying the habits and reproduction of the species, and give the result of their work in the January 'Journal of Conchology.' The



1 and 2, views of the shell: the line between them shows the natural size; 3, section of a leaf and egg-capsule attached to it; 4, view of leaf with empty egg-capsule attached; 5, leaf with capsule containing a partly-developed embryo; figs. 3-5 magnified.

animals were kept in captivity, and were noticed to deposit egg-capsules on the side of the vessel, which were similar to those previously collected on reeds in the canal. The egg-capsules are deposited singly, and are lenticular in shape, horny and transparent. Each capsule has a flat base by which it is attached to objects, and this free portion has a broad, thin, laminated keel. The enclosed egg much resembles a small fig seed. Further details of these interesting observations will be seen in the illustration, for the loan of which we are indebted to the Editor of the 'Journal.'

FOSSIL PLANTS IN SOUTH LANCASHIRE.

In continuation of his work amongst the vegetation of the Carboniferous Period, Mr. E. A. Newell Arber has a valuable paper on the Fossil Plants from the Ardwick Series of Manchester, in the 'Memoirs of the Manchester Literary and Philosophical Society,' just issued. As the Manchester Coalfield is

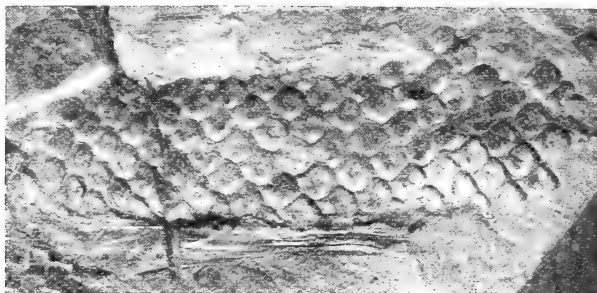


Fig. 1.

now nearly exhausted, it is not expected that many more fossil plants will be obtained. Mr. Arber has carefully examined the examples in the Museums at Owens College, Jermyn Street, and Cambridge, and has given an up-to-date description of them.

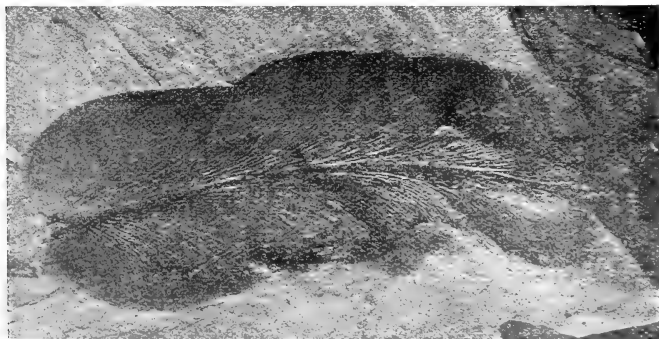


Fig. 2.

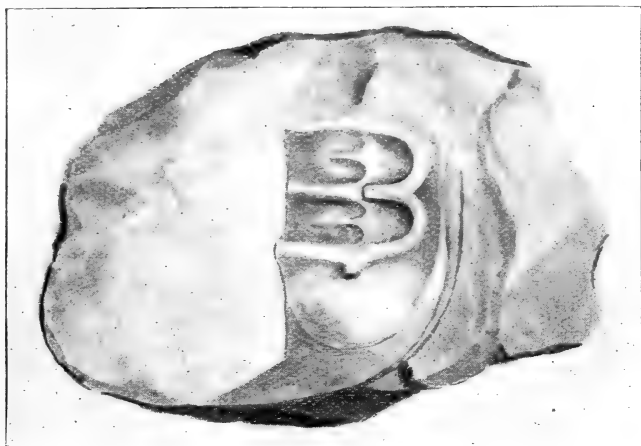
Much valuable information in reference to early vegetation has been obtained since the specimens collected by Binney, Salter, and Williamson were originally described. Some interesting illustrations accompany Mr. Arber's notes, two of which we are able to reproduce by the kindness of the Manchester Society.

Naturalist,

Fig. 1 is a specimen of *Lepidodendron dichotomum* from Ardwick, slightly enlarged, showing the characters of the leaf cushions. Fig. 2 is a frond of *Neuropteris Scheuchzeri*, slightly enlarged. This species is perhaps the most common fern-like plant in the Ardwick Series. Formerly it was described as *N. cordata* Brong., but Mr. Arber is not aware of an example of that species having so far been found in British rocks.

RARE CRUSTACEAN AT ROCHDALE.

In the 'Transactions of the Manchester Geological and Mining Society,' recently published, Mr. W. Baldwin describes a specimen of *Belinurus bellulus*, from the Middle Coal Measures of Rochdale. This example, which is now in the Rochdale Museum, is the head shield of the crustacean, in fair condition.



Belinurus bellulus from Rochdale.

It is from the same horizon that yielded *Prestwichia rotundata* to Mr. Baldwin two years previously. The author gives a figure of the specimen, which we are able to reproduce through the kindness of the Council of the Society.

XYLOPHASIA ZOLLIKOFEI.

Mr. T. A. Lofthouse's capture of *Xylophasias zollikoferi* ('The Naturalist,' December 1903, p. 456) having aroused considerable interest among lepidopterists, Mr. G. T. Porritt has kindly furnished the following particulars of the other British captures of the species. The first was recorded by the late Mr. Henry

Doubleday in 'The Entomologist,' Vol. 5, pp. 29 and 30, and was taken by Mr. Harding at Deal on 17th October 1867; this specimen is now in the Doubleday collection in Bethnal Green Museum. The second example was recorded by the late Dr. F. Buchanan White, F.L.S., in 'The Scottish Naturalist,' Vol. I., pp. 267 and 268, and was taken by Mr. Tait at Inverurie, Aberdeen, in September 1871. These, with Mr. Lofthouse's capture at Middlesbrough on 26th September last, are the only three known occurrences of the species in Britain, and it will be noted that the localities are as widely apart as they could well be. Probably all the British captures were immigrants, although the species is regarded even on the Continent as one of the rarest of the Noctuæ, and the only very few specimens, which seem to have occurred there were taken near Berlin, and in Hungary and Russia. Mr. Lofthouse's specimen has been figured and coloured to appear in Volume IX., now approaching completion, of Barrett's 'Lepidoptera of the British Islands'; and there is also an uncoloured figure of the moth, which is a large and variable species, in the late Edward Newman's 'Insect Hunter's Year Book' for 1869.

FLOWERING PLANTS.

East Riding Plant-records.—Besides the list of additions to the Flora of the East Riding which appears in the lately issued Transactions of the Hull Scientific and Field Naturalists' Club, two more fairly notable records must now be added, namely, *Valeriana mikanii*, in marshy ground near Driffild, June 1903, and *Carex Goodenovii* var. *juncella*, Skipwith Common, July 1903. Both records are due to Mr. Chas. Waterfall, of Hull, and have been confirmed by Mr. A. Bennett, F.L.S.—J. F. ROBINSON, Hull.

Navelwort in North Derbyshire.—On 11th October last, while fungus hunting near Grindleford, in company with Mr. C. Bradshaw and Mr. E. Snelgrove, we found the Navelwort (*Cotyledon umbilicus* L.) growing in an old wall behind the historic Padley Chapel (now used as farm buildings!). In Mr. Linton's 'Flora of Derbyshire' the plant is only recorded from five localities, most of these being old records. The author writes me that it is one of the plants which seems to be becoming rarer.—THOS. GIBBS, 197, Cemetery Road, Sheffield, 13 December 1903.

LINCOLNSHIRE COAST BOULDERS.

F. M. BURTON, F.L.S., F.G.S.,

Gainsborough.

WHILE on the Lincolnshire coast at Sutton-on-Sea in July last I collected such boulders as appeared to me at the time to differ from those I had found before (an account of which is given in 'The Naturalist' for 1898, p. 133), and sent them up, 17 in number, to Mr. T. Sheppard, F.G.S., Curator of the Municipal Museum, Hull, who has kindly named them and had them verified by Mr. Percy F. Kendall, F.G.S. The numbers of those sent up—21 to 37—are carried on from the numbers in the former list, to which they form a sequence, and the following is the description given :—

- 23, 29. A Porphyry of quite a distinct and characteristic type, found in the Boulder Clay of East Yorkshire. Probably Scandinavian, though a rock very similar occurs near Peterhead. This question, however, is at present under consideration.
- 26, 37. Trachytes, from the Southern Uplands (Scotland).
- 21. Typical Rhomb-porphry, from Christiania.
- 22. Dalecarlia (?) Porphyrite (Scandinavian).
- 32. Apparently a finer variety of No. 22.
- 30, 28. Probably from same source as Nos. 26 and 37.
- 34. Weathered Cheviot Porphyrite.
- 24. Angen-gneiss, probably Scotch.
- 33. Uncertain, very like a variety of No. 34.
- 31. Amygdaloidal Basalt. May be from *anywhere*.
- 27. Gneiss, probably from the Southern Uplands.
- 36. Hornblende-schist, also probably Scotch.
- 25. Granite, of doubtful origin.
- 35. Too weathered for definite opinion.

Of these examples several are new to the district, and are of considerable interest; while others, though they may vary a little in character, are similar in substance to those in the previous list.

Nos. 23 and 29 are the same as No. 5 in the former list.

Nos. 26 and 37—Trachytes—not sent before, though frequent on the Lincolnshire coast.

No. 21—typical Rhomb-porphry—'Rhomben-porphyr of Brögger. This is the first example I have met with in this district, and it is remarkable that on the following day another piece was found on the shore by Mr. H. Preston, F.G.S. This

rock is so conspicuous and well-defined that it is impossible it should have escaped notice before had it been at all common on this coast.

No. 22. This example (Dalecarlia (?) Porphyrite) is similar to Nos. 7 and 8 in the former list.

No. 34 (of which No. 33 is a probable variety) is a rock of some interest. It has long been known that erratics from the Cheviot hills have wandered down over the eastern portion of our land, leaving their remains scattered thickly over the intervening ground in a direct line down to the north bank of the Humber; and they have also been met with on the south (Lincolnshire) side of this estuary at South Ferriby, but no further. This fact was pointed out to me by Mr. Kendall, who wrote that, when recently in Lincolnshire with Mr. Stather, he was glad to find that the observation of the latter upon the abundance of Cheviot Porphyrites and Tweed Valley Greywacke Sandstones in the Upper Boulder Clay extended to this county, and asking me to work out further details. This, from one cause or another, I had no opportunity of doing until July last, when, amongst the boulders collected, No. 34 turns out to be a fragment of the ice-borne Cheviot Porphyrites I was in search of. Mr. Kendall has also obtained a specimen at Horncastle.

These Porphyrites would seem to embody the last efforts of the dying-out Ice-age and must be searched for high up on its outer fringes, as Mr. Stather has pointed out in his paper on 'The Boulders of East Yorkshire,'* bearing out Mr. Lamplugh's suggestion † 'that the North Sea ice-sheet attained its maximum development and reached farthest inland before the ice flowing from the north-west had reached this part of the coast, and that the North Sea ice dwindled away as the flow from the Pennine Chain and the Cheviots gained strength.'

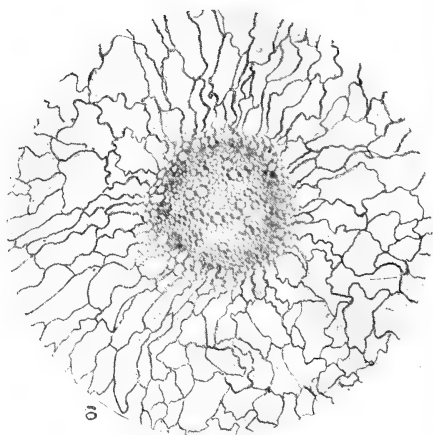
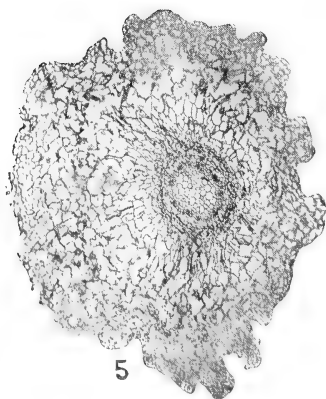
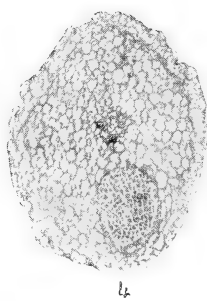
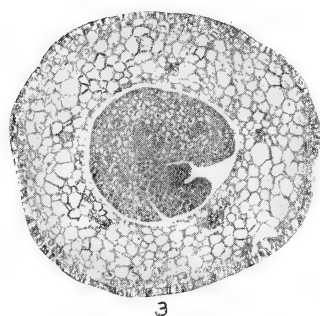
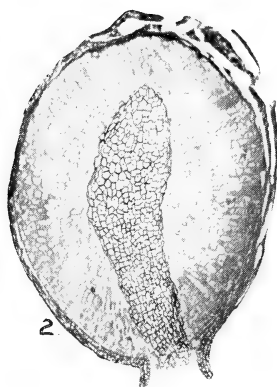
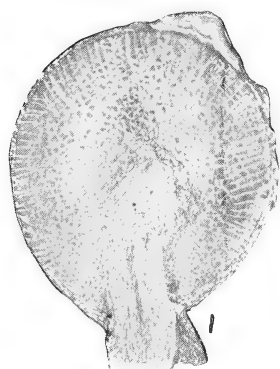
The remaining specimens require no special remarks beyond Mr. Sheppard's descriptions.

* Geol. Mag., p. 17, January 1901.

† 'Drifts of Flamborough Head,' Q.J.G.S., XLVII., p. 428.

TRICHOPTERA.

***Tinodes aureola* near Scarborough: a Trichopteron new to Yorkshire.**—I found *Tinodes aureola* at Hayburn Wyke, where it seemed to be fairly common during the second week of August last. It has not been previously recorded for our county.—GEO. T. PORRITT, Huddersfield, 8th December 1903.



Sections of seedlings (1-4) and contractile roots (5-6) of the Bluebell.
1, 2, and 5, $\times 20$. 3, 4, and 6, $\times 50$.

NOTES ON THE BLUEBELL.

T. W. WOODHEAD, F.L.S.,

Technical College, Huddersfield.

IN studying the vegetation of the woods in the Huddersfield district, and especially the distribution of the dominant types, the Bluebell (*Scilla festalis* Salisb.) formed a subject for special consideration. Probably no plant of the undergrowth appeals so strongly to one and all as this spring flower. It is especially characteristic of the oak and sycamore woods of the Coal Measures, presenting extensive sheets of blue, a sight quite unequalled by any other plant of our local flora.

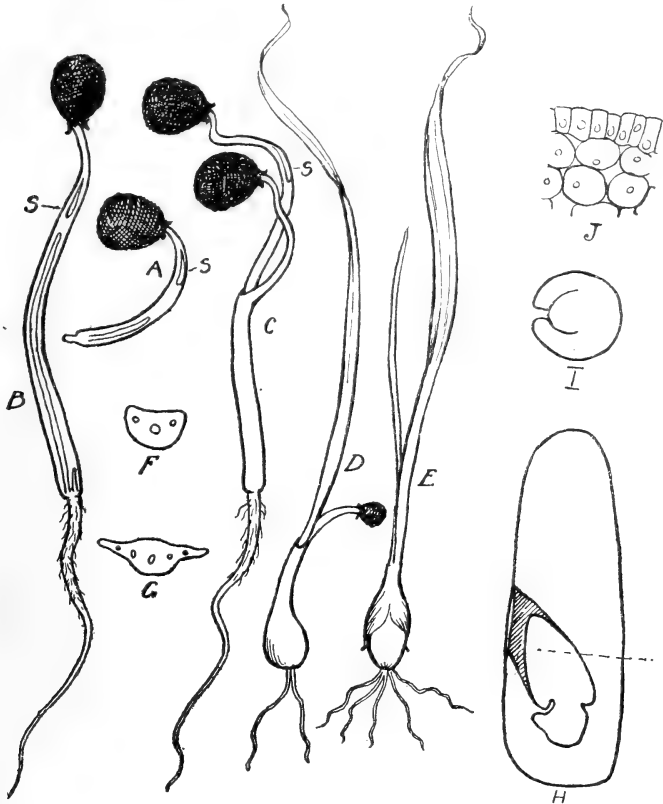


Fig. 1. a, b, and d, seedlings of different ages; c, root of one seedling grown into slit of another; s, slit; e, a plant in the second year with two leaves, outer scale leaf of bulb decaying; f, diagram of transverse section of first year leaf; g, ditto of second year; h, diagram of embryo; i, diagram of section of embryo passing through slit; j, a few of the absorbing epidermal cells of cotyledon.

In collecting material for study during May and June, numerous tiny bulbs and seedling plants in various stages of development were found growing amongst the old plants. At that time of the year seedlings may be found varying in age from a few months, to plants one, two, or more years old. Two of these young plants are shown in Fig. 1, d and e. The first of these (d) represents a seedling in the first year of its growth. Emerging from the black shining seed is the cotyledon, a tubular structure surrounding the base of the plant, and springing from within this tube is a single narrow leaf. To study the early stages of development of such a plant, material must be collected in November. If at that time we search amongst the dead and decaying leaves of oak and sycamore, and in the vicinity of fallen withered fruit stalks of the bluebell, we shall find numerous seeds in various stages of germination, two of these are shown in Fig. 1, a and b ($\times 2$).

The seed is globular, with a hard, black, shining coat; on one side is a tiny projection indicating the positions of hilum and micropyle. A section of such a seed shows an outer coat of thick-walled, black-brown cells, and within this, two layers of thinner-walled cells; these represent the primine and secundine of the ovule. Next to this coat is a massive tissue, the endosperm, the cells of which have thick, curiously pitted walls of cellulose, and cavities crowded with starch grains (Plate III., 1 and 2). In the centre of this tissue is the embryo, a diagram of which is seen in Fig. 1, h. The single seed-leaf is large, with a solid tip, below it is curved in such a way as to enclose the plumule in a cavity, leaving only a narrow, elongated slit on one side (Fig. 1, h). When germination begins this leaf elongates and becomes a long, hollow tube with the plumule at the base. Sections through this region show this stem bud surrounded by the thickened base of the cotyledonary tube. Plate III.: 3 is from a microtome section; and 4 is from the same series at a lower level just before it joins on to the root stele. The first foliage leaf grows up within the tube, keeping pace with it, the lateral slit, already noticed in the embryo, being a little above the leaf tip (Fig. 1, s). Among a number of seedlings collected was found a curious instance of apparent fusion of two seedlings (Fig. 1, c), but careful examination showed that the tiny root-tip of one seedling had pushed its way into the slit and grown down the tube of another. The radicle elongates, and for a time functions as the sole root of the young plant, being richly clothed above with root-hairs.

Often such seedlings may be met with which have bored their way through five or six decaying leaves, amongst which the seeds became buried and protected in the autumn.

By the middle of December the seedling has grown to two or three inches in length, and immediately above the root is seen a slight swelling, the first indication of a bulb. The relationship of the parts in this region is shown in the diagram, Fig. 3, a. So growth continues until early in the following year; the foliage leaf grows rapidly, pushes its way through the slit in the cotyledon tube, grows upwards into the air, and finally attains a length of five to six inches. This forms the first green



Fig. 2, a, cells of tip of cotyledon (shaded), surrounded by cells of endosperm undergoing digestion; b, end of vascular bundle of cotyledon. $\times 200$.

leaf and assimilating organ, which is a narrow, solid structure, semicircular in section (Fig. 1, f) with three small vascular bundles running through it.

For a long time seed and seedling remain in close contact, the solid tip of the seed leaf, embedded in the endosperm, functions as a sucking or absorbing organ. To this end the cells of the tip are specially modified as seen in Fig. 2, a.* A section through the seed of a very young seedling, about the

* Haberlandt, *Physiologische Pflanzenanatomie*, 1896, p. 210.

age represented in Fig. 1, a, is shown in the plate Fig. 1. Here we see that the endosperm cells immediately surrounding the cotyledon tip are deprived of their starchy contents. Fig. 2 of the plate is a later stage, in which the cell contents have disappeared in nearly all but the outer cells. The starch furthest from the tip is the last to disappear, and is seen in this illustration still densely crowded around the micropyle. Ultimately the cellulose walls undergo digestion (Fig. 2, a), and nothing remains but the empty shell of the seed.*

The phloem of the vascular bundle is large, and in intimate relation with the elongated cells forming the tip (Fig. 2, b), and so especially fitting the cotyledon to act mainly as a conductor of organic materials from the endosperm downwards.†

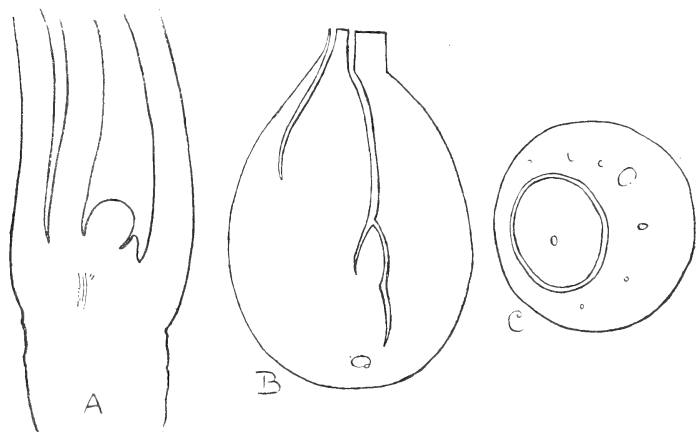


Fig. 3, a, longitudinal section through the tubular base of the cotyledon; b, longitudinal section of a seedling bulb showing enlarged leaf bases; c, transverse section of same; diagrammatic.

The upper portion of the seed leaf gradually withers, and may be seen as a slender thread which finally disappears. The lower portion, however, enlarges considerably, and forms the first fleshy scale leaf of the young bulb (Fig. 1, d). A diagram of such a bulb is shown in longitudinal section in Fig. 3, b, and in transverse section at c ($\times 6$).

* Several seeds were found in Birks wood, sections of which showed them to be packed with fungal hyphae, the embryo and endosperm being entirely absorbed, and hyphae emerging from the micropyle. This suggests the possibility of the bluebell being inoculated by a fungus in a way similar to *Conium maculatum* by *Symphosira parasitica* (Nat., Jan. 1903, p. 6).

† Sargent, Theory of the Origin of Monocotyledons, Ann. Bot., 1903, p. 1.

The cotyledon thus performs a double function, firstly, a sucking organ by means of its specially modified tip; secondly, by means of its now enlarged base it forms the first storage organ of the young plant.

From the thickening stem base adventitious roots arise, and these take the place of the now withered primary root.

The single foliage leaf continues its activities until June, and then signs of decay appear, first at the tip. Meanwhile the base of this leaf has been enlarging, storing up reserve materials, and adding its quota to the enlarging bulb (Fig. 3, b).

The leaves of the second and third year are still narrow, and the development of a flattened blade is slow, the first indication

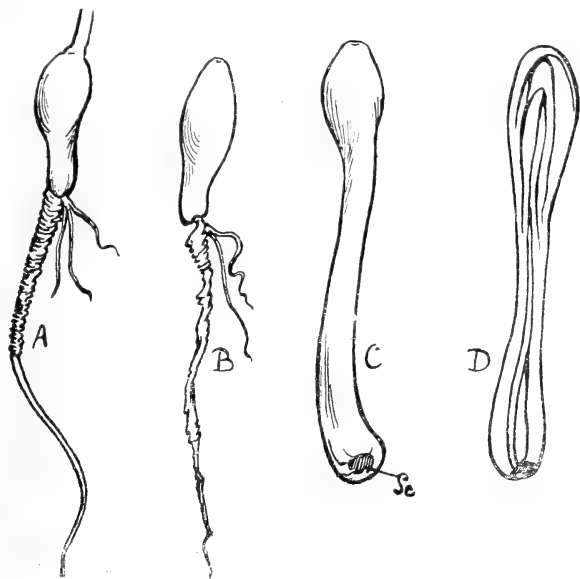


Fig. 4, a, slightly elongated bulb with contractile root; b, contractile root decaying; c, much elongated bulb; d, longitudinal section of same. Sc. root scar, now lateral in position.

being the formation of slight wings on either side (Fig. 1, e, and in section at g); it is not until the fifth year that mature flowering plants are developed.

At first the young plants grow amongst the loose humus at the surface, but preparations have to be made for burying the bulb deeply and firmly in the soil. This is brought about by the development of large median roots four to five inches or more in length, tapering gradually from above downwards. These roots examined in May will be seen to be transversely wrinkled in the upper region (Fig. 4, a).

If transverse sections are made through different regions of the root and compared they help to explain this feature. Sections through three regions of a fresh root are shown in Fig. 5. The first one (Fig. 5, a) shows the cortical region of the, as yet, unwrinkled portion, where we see that the cells are all small and rounded. A section through the middle of the wrinkled portion is seen at b, also Plate III., 5; the mid-cortical cells in this case have greatly elongated radially, producing a distortion of the outer cells; whilst in section c, taken through a part near the bulb, not only have these cells, but the inner ones also, undergone radial elongation (Plate 3,

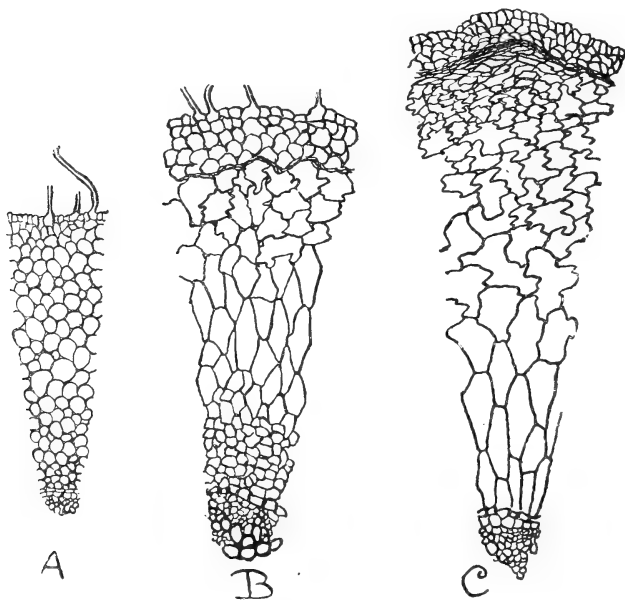


Fig. 5. transverse sections through cortical regions of contractile root; a, through uncontracted region; b, at a higher level showing radial elongation of mid-cortical cells; c, near bulb, radial elongation complete. $\times 50$.

Fig. 6). In this region the cells which originally elongated have been in turn compressed and, along with the outer cortical cells, form a much crumpled tissue.

As Hugo de Vries long ago showed,* this change is brought about in roots by the increasing turgidity of the cortical cells, which in these cases are more extensible transversely than longitudinally. On the other hand, if roots are placed in alcohol,

* Hugo de Vries, Bot. Zeitung, 1879, p. 650.

salt solution, or other reagent which will reduce turgidity or destroy the protoplasm, they elongate.* These features may be easily observed in the bluebell. Transverse sections through the contracted part of a root, preserved in alcohol, are shown (Plate III., 5 and 6); if these are compared with Fig. 5, b and c, the shortening of these cells as well as the numerous wrinkles of the walls are well seen. In consequence of these changes the cortical cells, while elongating transversely, shorten longitudinally, and this region of the root, from one to three inches, becomes much contracted. The vascular tissues are also passively involved, and become shortened and bent (Fig. 6, a).

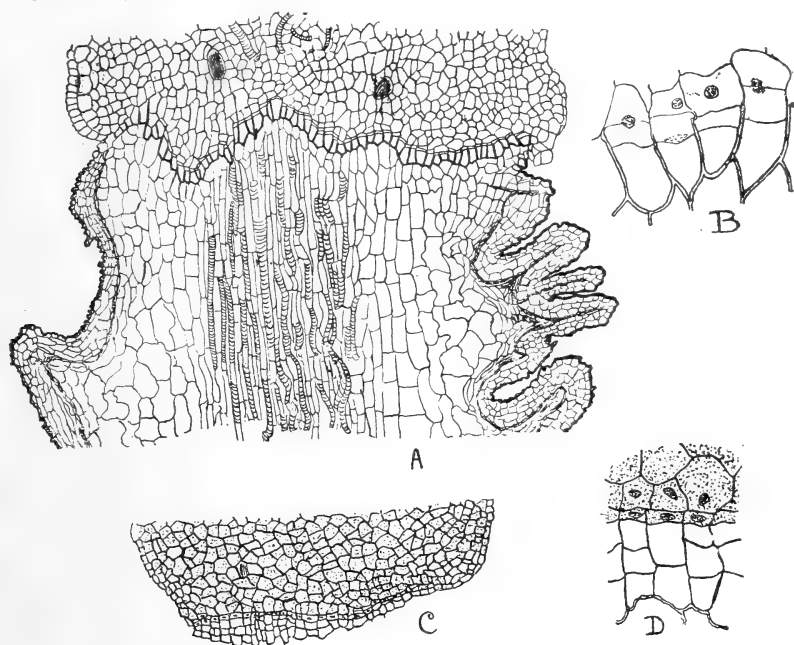


Fig. 6. a, longitudinal section through base of bulb and upper region of contractile root, showing absciss layer, $\times 25$; b, a few cells of absciss layer enlarged, $\times 150$; c, section through a root scar showing formation of cork, $\times 25$; d, a few of these cells enlarged, $\times 150$.

The lower portion of the root, often four to five inches in length, being firmly fixed in the soil, the contraction of the upper region results in the bulb being pulled more deeply underground.† In the middle of May many such bulbs were found, and the contractile region measured three quarters of an inch. Roots were

* Sachs, *Arbeiten des botan. Inst., Würzburg*, I, p. 419; also *Physiology of Plants*, Engl. Trans., 1887, p. 576.

† Scott, *Flowering Plants*, p. 196.

examined at short intervals, and this region was found to be gradually extending. In the second week in June it measured $1\frac{1}{2}$ inches, and increased gradually until, on the 14th of July, a large proportion of the examples had a contractile region of exactly three inches. This seemed to be the maximum, and was reached in some cases by the end of June, in the majority by July 7th, and in others a week later. On the 28th of July most of these roots presented a very dilapidated appearance, and were generally in a state of decay (Fig. 4, b).

On this date a considerable number were dug up apparently devoid of them, but it was noticed that very slight pressure was sufficient to break them off, and also in their decaying state they were so similar in colour to the soil that they were easily overlooked, and great care had to be exercised to extract them whole.

A longitudinal section through the base of the bulb and upper region of the contractile root, is shown in Fig. 6, a. At the junction of the two a distinct wavy layer of cells is seen, with slightly thickened lower and lateral walls, the upper wall being very thin. Some of these cells, more highly magnified, are shown (Fig. 6, b). The thickened walls stain deeply with bismark brown, and the layer stands out sharply and well defined. The cells here undergo division and form an absciss or separation layer, which is completed by the end of June or early in July. In the meantime the nutrient materials are withdrawn, and the root is cut off and decays in the soil, leaving only a yellow-brown circular scar resembling a leaf scar (Fig. 4, C. Sc.). A section through one of these root-scars is shown in Fig. 6, c, and a few of the cells enlarged at d.

The base of the bulb develops more on one side than the other, and in time the contractile root is placed laterally. Through this enlarged portion adventitious roots bore their way (Fig. 4, a). A new contractile root is developed each year until the requisite depth is attained. In the older, nearly mature bulbs, three or even more such roots may be formed, the longest measured, had a contractile region of three inches, and a terminal region of five inches.

The contraction of roots was first noticed in 1819 by Tittmann (usually quoted Fittmann), who mentions it occurring in roots of *Aster chinensis*, *Daucus carota*, and 'most other Dicotyledons.'* Later by De Vries and Sachs in greater detail; in Aroids by Irmisch† and by others, but except for external appearances figures are not given.

* Tittmann, Botanisch-karpologische Bemerkungen. Flora 1819, Bd. II., P. 651.

† Irmisch, Beitr. zur vergl. Morph. 5 Abth, Halle XIII., 2, 1874, p. 161.

COAST CHANGES IN THE NORTH OF ENGLAND.

A COMMITTEE of the British Association, appointed to inquire into the changes on the sea-coast of the United Kingdom, presented their report at the Southport Meeting, from which the following information, relative to the northern part of England, has been extracted.

In the year 1899, with the consent of the Lords of the Admiralty, the Committee drew up certain forms, which were forwarded to the various coastguards. Since then the forms, duly filled in, have been regularly received from the coastguard stations by the British Association. The Committee secured the services of Mr. John Parkinson, M.A., of Cambridge, to collate the data in hand, who has drawn up the detailed report published by the Association.

FROM ST. ABB'S HEAD TO SALTBURN.—The changes on this coast appear to be insignificant, but losses are recorded in the neighbourhood and to the north of Hartlepool, near Shields, and on the northern side of Blyth, the latter part being now protected. On the other hand, small gains of land are reported from Holy Island Sands and St. Gan Breakwater, Redcar. As regards the coast-protections, Berwick is shielded by a pier, while Newliggin and Cresswell (Wansbeck Road to Chevington Burn) are groyned. South of this section the list of coast-protections given in the returns apparently understates the truth, nothing of the kind being mentioned from Tynemouth and South Shields. The northern side of Blyth Harbour is protected by a wall, and piers have been built at Sunderland and Hartlepool. At the latter town the sea- and dock-walls have a tendency to keep the sand in the bay. The concrete pier erected at Skinninggrove is said not to affect the beach.

Sand is removed from Berwick, Bamburgh, the Amble and Hauxley district (Alnmouth), from the neighbourhood of South Shields (from Briar Dene Burn to Low Light), Sunderland, and the north of Seaham, and from Saltburn. On the contrary, it is not removed from the ten miles of coast between Wansbeck River and Briar Dene Burn (Blyth Haven), from South Shields to Souter Point, and from Seaham Harbour and Hawthorn Hive.

THE YORKSHIRE COAST SOUTH OF SALTBURN.—For the stretch of coast between SALTBURN and SCARBOROUGH BAY no returns have been received, but for the important district between FILEY

POINT and SPURN HEAD the records are complete, and the following may be taken as a general summary :—

Between Filey Point and Flamborough Head the coast-line is practically stationary, except in Filey Bay, from Filey Brig to the King and Queen Rocks at Speeton, where the average loss for some twenty-eight years is about three feet per annum. On the southern side of Flamborough Head the rate of erosion is about the same. The town of Filey is protected by a sea-wall. No groynes exist at Speeton, and shingle and sand are being constantly removed during the winter months; but on the southern side of Flamborough Head (at Sands Road) one groyne has been built which retains the beach sufficiently to enable carts to get down to and to remove the sand. This loss is stated to have no apparent effect. At Bridlington Quay parades and a sea-wall prevent subsidence to the north and south of Bridlington Harbour, where there was formerly an annual loss of about six feet. Piles are driven in close to the sea-wall, and groynes prevent the scour of the beach and retard the travelling sand and shingle. To the north of Wilthorpe Gap groynes protect the beach, but do not prevent subsidence of the cliff. At Flamborough Head, Bridlington Bay, freshwater springs cause the initial slipping of the cliff. The Divisional Officer, writing from Bridlington Quay concerning the coast from $3\frac{1}{2}$ miles north of Filey Brig to Gimston Garth, 9 miles south of Hornsea, states that shingle, sand, and stones, are removed from most places, except from Atwick Gap to Garton Gap, where the beach is protected by order of the Board of Trade. Along this coast, from Bridlington Quay to Spurn Head, practically the whole coast is receding at the average rate of six feet per annum, where not especially protected as in Bridlington Harbour.

Groynes exist at Hornsea, both to the north and south of the village, and keep the shingle in place; elsewhere the loss appears to be between three and four feet per annum. At Withernsea groynes in a bad state of repair are placed 100 yards apart, but the average annual loss is nine feet per annum; shingle is not removed. At Sandlemere and Hompton an annual loss of nine feet per annum is also recorded.

From Kilnsea Warren to Spurn Point, a distance of 4 miles, groynes retain and build up a good beach; nevertheless the annual loss is given as six feet. Three observations of definite change witnessed have been supplied on Form II. The first relates to a large fall of clay in June 1899 at Pampletine Cliff,

Filey. The mass was 60 yards in length by nine yards in breadth, having a depth of some 100 feet. Such slips, which are not uncommon, are produced not merely by the encroachment of the sea, but also through heavy rains and springs. At Ulrome (between Hornby Runnell and Atwick) about 15 feet of cliff disappeared in 1899; the average annual rate is estimated at six feet. The cause is locally attributed to the scarcity of sand at the base of the cliff; and it is noted that the loss is greatest where the cliffs are highest.

An undated report (probably 1899-1900) from Kilnsea records a very rapid loss of land. In two months these slips reached the extent of 50 yards inland and 100 yards in length, and occurred at intervals along some five miles of coast. Additional information, received in July 1903, from Withernsea states that a large quantity of cliff has been washed away since 1899 or 1900 from Wareholme [Waxholme?], Garton, and Dimlington.

The shingle is not removed from Hornsea to Kilnsea.

THE HUMBER ESTUARY.—The records for the 'Estuary of the Humber' are also fairly complete up to and beyond Barton. On the northern bank Cherry Cob Sands and Sunk Island Sands show slight gains, due to the building of five chalk-stone groynes. On the southern bank the more northerly part of Cleethorpes shows some gain: it is protected by a sea-wall and groynes. Also at Tetney Haven, to the south of Cleethorpes, sediment is deposited upon the foreshore for an area of some $2\frac{1}{2}$ miles in length and $\frac{1}{2}$ mile in width at spring tides. The observations extend as far south as Northcotes Point. The low and muddy shores of Marfleet and Paull, on the northern bank, show no change, but variable erosion is reported from Barton and Killingholme, where the shore is unprotected, and on the southern shore of Cleethorpes through heavy gales. Nearly all the southern bank of the estuary is protected by sea-walls or groynes. At Killingholme the clay banks, their summits six or eight feet above the beach, are covered, more or less completely, by an apron of chalk and ironstone. A shingle bank is said to be accumulating on the northern shore of South Killingholme Haven, and a large sandbank in the river between North Ferriby and Hessele. In the neighbourhood of Ferriby Hall, Barton Cliff, and Barton Ness (Barton-on-Humber) the recorded loss is from four to six feet in two and a half years. Small groynes have been built from the rifle butts (3 miles west of Hull) to North Ferriby, but are said to have no effect upon the beach. Docks and piers occupy part of the bank between

Barrow Haven and Chalk Point, and stones have been deposited to protect the banks near Barton Cliffs. Apparently erosion in the estuary of the Humber is not very serious, for (in July 1903) the loss of land at Barton-on-Humber is said to have been imperceptible since 1899, while at Killingholme no change has been recorded in the same time. At Cleethorpes, however, about twenty feet of bank have been washed away in this period; but the sea-wall is now being extended for $\frac{3}{4}$ mile E.S.E. to protect the part in question.

LINCOLNSHIRE AND THE WASH.—Along the remainder of the Lincolnshire coast, the borders of the Wash, and the Norfolk coast as far east as Salthouse at Lower Sheringham, the losses of land are also insignificant. From Northcotes Point (south of the Humber estuary), as far south as Ingoldmells Point, losses occur at Sutton-le-Marsh and Chapel St. Leonards. Elsewhere the coast-line is stationary. At Anderby there are no groynes, and the shore is fringed with sandhills covered by gorse and grass; while from Theddlethorpe northwards it is protected by groynes at intervals. At Chapel parts of the sandbank are washed away during each winter, but the shore is protected by groynes and faggots, which help to make up the banks. No sand is removed for any purpose. In the neighbourhood of Sutton and Mablethorpe the low sandy beach suffers a similar loss, and the shore, moreover, is unprotected by groynes. As at Chapel, no sand or shingle is allowed to be removed.

On the remaining Lincolnshire coast, and that of Norfolk as far as Salthouse, but one loss is on record, viz., between Old and New Hunstanton. The contrary is the case in many parts of the Wash; thus, from Lynn Cut to Wooten Creek the sea has apparently been receding during the last five years, and land once under water is now covered only by high spring tides. Banks are built to keep back the sea and reclaim the land for cultivation. The same system is adopted east of Sutton Bridge (near the mouth of the river Nene), where the last inclosure (1899) was made in 1865. From the south point of Fleethaven to the Lighthouse (river Nene), Drove End Detachment, C.G.S., the land is reported to be gaining on the sea. It is protected by banks near Freiston and Butterwick on the western side of the Wash. At Ingoldmells C.G.S. piers tend to keep the sand and shingle up to the banks. Beach material (or mud locally) is removed from the neighbourhood of Ingoldisthorpe, the river Witham, and Skegness. The low coast of the last-named place is unprotected by groynes.

LANCASHIRE AND CUMBERLAND.—Information concerning the Lancashire and Cumberland coast is but scanty. The Marine Surveyor to the Mersey Dock Board has kindly given information on the shore between Hilbre Island and Formy Point. He notices an encroachment of the sea along this part of Liverpool Bay. The coast is not protected by groynes, but embankments have been put up here and there near high-water mark. Occasionally loads of sand are removed.

At Maryport, in Cumberland, erosion is also reported, especially about $\frac{1}{2}$ mile N.E. of Maryport Harbour, where the loss is heavy. The coast is low and both sand and stones are taken from the shore. At Silloth, where the coast is sandy and flat, no change is recorded.

PURE CULTURES OF FUNGI FROM ORCHID MYCORHIZA.*

A. D. COTTON, F.L.S.

THE pure cultures referred to below were obtained from the roots of various species of *Eria* (a tropical epiphytic Orchid).

The fungi are grown on various media, and two distinct forms of reproduction have been obtained. One consists of hyaline fusiform septate spores on aerial hyphæ and resembles *Fusisporium endorhizum*, and the other of round, thick-walled spores, pale brown in colour, generally produced in the substratum; these are more of the nature of chlamydospores.

The mycorrhizal mycelium is abundant in the roots, and the brown-coloured spores above referred to may often be seen in the outer layers of the cortex or in the root hairs. The spores are found to germinate readily, and if grown in any of the ordinary cultured solutions produce a vigorous growth.

To obtain pure cultures the following method was employed. The root hairs were shaved off with a razor and floated into a watch glass of sterilised water, and a large number of hanging drop cultures made with the usual precautions. Ward's tubes are very convenient for this purpose, and the cultures can be closely watched; all those seen to be impure were at once destroyed.

* Abstract of Paper prepared for the Fungus Foray at Hemsley, September 1903.

1904 February 1.

The spores in the root hairs on germination gave rise to a mycelium which produced the fusarium-like spores alluded to above. This was repeatedly verified; under certain conditions the amount of myceline produced is very small, and the hyaline spores are formed at a very short distance from the germinating brown spores. The hanging drop cultures were transferred to Petri dishes containing sterilised bread, plum jelly, wood, orchid pseudo-bulb, etc., and thus far only these two forms of spores have been obtained. When first transferred to the new media, growth takes place very rapidly and masses of the hyaline spores are produced. After a few weeks the round brown spores begin to be formed; the production of these latter varies greatly with the media on which they are grown. No ascigerous stage has yet been found, but it is hoped that the conditions required for the production of the same will soon be known.

Other observers have described similar fungi from the roots of different orchids. Wahrlich (Bot. Zeit., 1886) obtained from two species of *Vanda* a fungus very similar in appearance to that found in *Eria*; but though the conidial stages of the fungus found in the two species of *Vanda* were very similar, the ascigerous stage differed sufficiently from one another for him to regard them as different species. Chodat and Lendner (Rev. Mycol, 1898) also described the mycorrhizal fungus of *Listera cordata* as resembling that of *Vanda*.

QUARTZITE PEBBLES ON THE YORKSHIRE WOLDS.

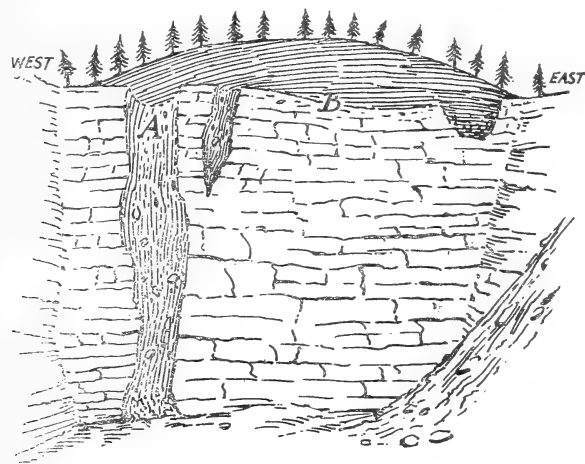
T. SHEPPARD, F.G.S.,

Hull.

WHILST assisting through the press Mr. J. R. Mortimer's forthcoming work on 'Forty Years' Researches amongst the British and Anglo-Saxon Burial-mounds of East Yorkshire,' many items have come under my notice which may be of interest in connection with Mr. Stather's paper.* In the first place, it should be borne in mind that the Britons almost invariably chose some prominent point for the erection of their barrows, advantage being taken of any slight rise on the surface. Mr. Mortimer frequently records the fact that barrows have been erected upon large circular pipes of sand which penetrate the chalk for some distance. This sand is usually of a ferruginous nature and exceedingly

* See 'Naturalist,' January, p. 9.

compact, and consequently its position is indicated on the land by being slightly higher than the surrounding chalk-surface, which appears to have been denuded at a more rapid rate. Occasionally one of these sand pipes, in which no burial occurred, has been mistaken for a barrow on account of its resemblance to the artificial mounds. Similarly, these sand pipes are occasionally met with on the Wolds during excavations for chalk, and the accompanying block, illustrating a section in a chalk-pit on Painsthorpe Wold, which has been kindly lent by Messrs. A. Brown & Sons, shows a vertical section of one of them.



Chalk Pit on Painsthorpe Wold.

As no sand now occurs on the Wolds, these pipes are obviously of great age, and in view of Mr. Stather's remarks it is interesting to observe that the only pebbles found amongst the sand are rounded quartzites, and they occur not uncommonly.

When the excavations were being made in Cook's pit at Hessle, some years ago, an item worthy of record was noticed. These pits disclosed sections of sand, and angular chalk fragments, surmounted by boulder-clay, the whole being banked up against the pre-glacial chalk-cliff of Holderness. A great part of the material below the boulder-clay had obviously been washed from the Chalk Wolds, over the cliff edge, on to the old beach. Amongst this *débris* rounded quartzite pebbles were occasionally met with. At one place, where the section was cut to an unusually great depth, dozens of quartzite pebbles were noticed amongst the large angular chalk fragments. The lowest

beds in the series obviously represent the first washings from the Wolds, and the fact that amongst them quartzite pebbles were most plentiful seems to indicate that formerly the Wolds were thickly strewn with them. Several hollows yet remain in places, filled with sand and occasionally well-worn boulders.

Another record worth noting in this connection is the occurrence of a large subangular mass of quartzite, over two feet in length, which I noticed last summer in the fine chalk-wash at the base of the cliffs near Sewerby. As at Hessle, this Sewerby chalk-wash represents the first flood-sweepings from the Wold tops.

Two other records of quartzite pebbles are known in interesting situations, and the actual specimens themselves are in Mr. Mortimer's museum at Driffield. They were obtained from the masses of hard chalk breccia known by the names of the St. Austin's Stone, near South Cave, and the Fairy Stones, at Burdale, respectively. These masses of breccia, which now stand out some distance above the surrounding chalk land-level, were evidently formed in old cracks in the chalk, and the quartzite pebbles would find their way into these cracks together with the chalk 'grut,' which eventually solidified and formed the cemented masses.

NORTHERN NEWS.

Mr. O. Whittaker gives particulars of the aquatic water-bugs he has obtained near Bolton (Lancashire) during the summers of 1902-3, in the December 'Entomologist.'

Mr. Harold Pickles contributes 'Trapping on the Moors,' and Mr. E. Halliday 'Dark Varieties of Moths,' to the December Halifax Naturalist. Both are of local interest.

Dr. F. A. Bather has reprinted his presidential address to the Museums' Association (see 'Naturalist,' August 1903, p. 291) from the Museums' Journal. It is a substantial volume, and is illustrated by 36 excellent plates.

Miss C. F. Piercy informs us that a Sparrow was shot at Garton-on-the-Wolds recently which was quite white, with the exception of a few scattered brown feathers. Another, with a white head, is still in the neighbourhood.

Mr. J. E. Ellis contributes a suggestive paper on 'Geology for the Schools' in the Quarterly Transactions of the Leicester Literary and Philosophical Society just issued. The paper is an urgent appeal for the close study of geology for scholars in elementary schools.

The Royal Commission on Coal Supplies has appointed Mr. P. F. Kendall, F.G.S., of the Yorkshire College, Leeds, to report upon the eastward extension of the great York, Derby, and Nottingham coalfield, under the newer rocks. The inquiry is a very large one and will involve a discussion of the possible extensions to the north-east and south-east, as well as directly eastward.



The Hall-i'-th'-Wood.

REVIEWS AND BOOK NOTICES.

The Rochdale Literary and Philosophical Society has issued another substantial and well-printed volume, containing a record of the Society's Transactions from 1900 to 1903. The publication contains several excellent papers—some of general interest, some dealing with America, Scotland, and other far distant countries; and a comparatively small proportion deal with subjects of local value. Amongst these are 'Manchester's Contribution to the Chemistry of the Nineteenth Century,' by J. H. Brittain, and 'Notes on the Lives of Samuel Crompton, the Inventor, and John Bradshaw, the Regicide,' by I. Renshaw. This is illustrated by a representation of the Hall-i'-th'-Wood, or Bradshaw Hall, as it appeared in 1845. By the courtesy of the Society we are able to reproduce this. The Hall-i'-th'-Wood is a picturesque old mansion, and a fine example of the black and white 'post and plaster' style of the Tudor period; the walls in the original portion of the structure being formed of 'wattle and daub.' This excellent building is now used as a museum.



The Transactions of the Hull Geological Society for 1900-1 have just been received. They must not, however, be taken as a record of an average year's work of this Society, which is capable of much more than set forth in their pages. We are pleased to find that more space has been devoted to purely local work, and that the summaries of lectures on general topics have been omitted. One paper is printed in extenso, and contains details of the sections exposed during the construction of the Alexandra Dock Extension, Hull, by the present hard-working President of the Society, Mr. W. H. Crofts. This is illustrated by a plate and sections. Useful for reference are the Report of the East Riding Boulder Committee for 1900, by its Secretary, Mr. J. W. Stather, F.G.S., and 'Some Local Borings' and 'East Yorkshire Bibliography, 1900,' by Thomas Sheppard, F.G.S. The remainder of the publication is occupied by reports of the Society's field meetings during 1900, which contain a record of field work of which any society might be proud. If we might suggest an improvement, it is that more space should be occupied by the results of the work of the members, so far as they apply to East Yorkshire, and that these results should be published more promptly. Neither is it necessary to devote so much space to title, contents, officers, and list of members in each part of each volume. The publication is sold at 2/-.

'The Migration and Dispersal of Insects.' By J. W. Tutt, F.E.S. Elliot Stock, 62, Paternoster Row, London, E.C., 5s.

This book consists of a series of papers which have been for some time appearing at intervals in the pages of the 'Entomologists' Record.' Their issue in this complete form is very timely, because lately a good deal of interest has been revived in the migration of insects, and more particularly of the lepidoptera. The extraordinary and valuable observations made by Mr. W. Eagle Clarke, F.L.S.—a former secretary of the Yorkshire Naturalists' Union—when stationed on the Kentish Knock Lightship from 17th September to 18th October last (Ent. Mo. Mag., December 1903, p. 289); and when the sun-loving butterfly, *Vanessa cardui*, was repeatedly observed to be flying against the lantern from 8.45 p.m. to midnight on 22nd September, thus proving that part, at any rate, of its migrating is done in the night; together with the remarkable invasion of a number of other species, including several of the greatest rarity in Britain, during the week following that date, should render this summary by Mr. Tutt, of nearly all the recorded migrations of insects of all orders during the past hundred years or so, more than ordinarily acceptable. It is unnecessary, too, to tell anyone who knows anything of the writings of the author, that the subject is exhaustively treated. Every phase of insect migration and dispersal is carefully considered. The migratory instinct of some of the larger orthoptera and other orders; the apparently voluntary but altogether unaccountable migration of some lepidoptera; the probably involuntary flight, brought about by strong winds and other atmospheric conditions—of many lepidoptera, neuroptera, trichoptera, and probably most of the other strong flying orders; the dispersal of insects by water, by shipping, and other numerous means, are all treated of in the fullest detail. Study of this migration and dispersal of insects cannot fail to be of the greatest interest and scientific value, for, although it is scarcely likely that there is any regular migration from one country to another—to say nothing of a return journey, on the part of any single species—that is as we understand migration in the case of birds, it cannot be doubted that it has a so far-reaching effect on the very existence of a no inconsiderable portion of the insect fauna of the British Islands, that were it not for these periodical invasions, many of our so-called British species would soon be non-existent with us. That our fauna, too, is being constantly and rapidly augmented through dispersal by means of shipping is seen by the comparatively recent additions of such orthoptera as *Periplaneta americana*, *P. australasica*, and others, which, in a very few years, have already spread over our country. Others like *Anisolabis annulipes* and *Apterygida arachidis*, with many of the dried fruit-feeding lepidoptera, etc., increase here rapidly directly they find congenial settlement. Again, in the 'Monograph of the British Coccidæ,' recently issued by the Ray Society, Mr. Newstead tells us that out of eighty-eight British species, fifty-one have undoubtedly been introduced from other countries.

We have one fault to find with Mr. Tutt's book: it should not have been sent out in such a paltry paper cover; it is worthy of a better, and at its price ought to have had one.

G. T. P.

The 31st Annual Report of the Peterborough Natural History, Scientific, and Archæological Society is to hand. It contains particulars of the additions to the Society's museum during 1902 and a list of birds and eggs 'wanted.'

'Knowledge Diary and Scientific Handbook for 1904' can be particularly recommended to scientific men on account of the suitability of the information contained therein. It is of a handy size, and has ample space provided for monthly notes, etc. The volume contains papers on meteorology, astronomy, microscopy, etc., by well-known writers, which, however, seem almost lost in a diary. The frontispiece is a portrait of Darwin. (326, High Holborn, W.C., 3s. net.)

Barrow Naturalists' Field Club and Literary and Scientific Association. Annual Report, Proceedings, etc., for 26th year, ending 25th March 1902, Vol. XVI. Carruthers, Barrow, 1903.

It would seem by their latest issue that the Barrow naturalists are in a fair position financially and otherwise. There is the usual amount of 'literary' matter and some scientific, including a good archæological paper by the present President (Mr. Gaythorpe), some nature study addresses by a competent authority (Mr. Hawkridge), and a very good paper on the 'Old Forest Laws' by Mr. H. G. Pearson, which might have appeared in full. Mr. Gaythorpe's paper is entitled 'Neolithic Man in Low Furness,' with notes on the geological strata (illustrated). There is a list of plants collected by Mr. J. Hosking, now in the possession of the club, dated and located, which some years ago would have proved useful. But it is good to know that the club is alive to present-day needs and methods, and that its President and officers are not likely to allow it to again become moribund.

The Hull Scientific and Field Naturalists' Club seems to be particularly fortunate in including in its membership gentlemen who are able to write valuable works on various subjects. Some of these have already been referred to in these columns. The latest publication issued by the club is an attractive-looking book, entitled 'Evidences relating to the History of East Hull from the Earliest Times.' It is by Mr. T. Blashill, F.R.I.B.A., and illustrated by numerous plans and sketches of old East Hull. (A. Brown and Sons, Hull, 3s. 6d.)

The eighth edition of 'The Naturalists' Directory,' 1904-5 (Upcott Gill, 1s. 6d.), has just been issued, and contains many items of interest to field naturalists. The lists of names of naturalists, under the various headings, will be useful to those anxious to correspond with others interested in similar studies. We notice the omission of names of many prominent workers, however, in these lists. The list of 'Natural Science Magazines' is also incomplete—'Man' and 'Museums Journal'—two magazines on our table at the present moment, not being included. There are some unexpected items in the 'Directory'; for instance, at Hull there appears to be a 'World-Wide Naturalists' Society (Corresponding),' which is new to us.

The Proceedings of the Liverpool Geological Society for 1902-3 (Vol. 9, Part 3) have been issued, under the editorship of Mr. G. E. Pepple. The pamphlet contains three papers of particularly local value, viz., 'Some Lithographs of Footprints, etc., from Storeton, issued by the Liverpool Natural History Society about 1839,' by Mr. H. C. Beasley; 'Quartz Dykes, near Foxdale, Isle of Man,' by Mr. J. Lomas (a paper which had previously appeared in the 'Geological Magazine'); and 'The Surface Geology of Cheshire in its Relation to Agriculture,' by Mr. W. Edwards. Of a more general character is 'The Study of the Volcanic Composition of Rocks (Part II.). The Examination of an Igneous Intrusion,' being the presidential address of Mr. C. C. Moore.

BIRDS.

Kingfisher at Horncastle.—In the centre of the town of Horncastle, within 100 yards of the Bull-ring, a Kingfisher is just now (9th January 1904) disporting itself on a branch of the canal formed by the river Waring, diving into the water to regale itself on small fry, to the great interest of the residents close by, on whose garden rails it suns and dries itself after these frequent immersions.—J. CONWAY WALTER, Langton Rectory, Horncastle.

MOLLUSCA OF HUBBARD'S VALLEY.

C. S. CARTER, M.C.S.,

Hon. Curator of the Museum of Louth Antiquarian and Naturalists' Society.

HUBBARD'S VALLEY, about a mile S.W. from Louth, is a ravine excavated in the Lower Chalk. It is less than three-quarters of a mile in length, and has a depth in one place of about 130 feet.

The steep slope on the eastern side of the valley is known as Hubbard's Hill and is well wooded, the principal trees being beech and ash, with a few oaks, larches and willows. The western side, which is less steep and only wooded in part, is known as Fisher's Hill. At the commencement of the valley, to the south, is a steep grassy slope, running a little distance almost at a right angle with the ravine.

All that remains of the torrent which excavated the valley is a small trout stream, whose waters are here augmented by several springs, flowing from between the Lower Chalk and the Red Chalk.

Altogether this ravine presents a remarkable and picturesque feature in the scenery of the district, greatly differing from the neighbouring pre-glacial valleys of the eastern slope of the wolds, all which are thickly banked up with boulder clay.¹

The molluscan fauna of the ravine is of much interest. That it is only moderately rich, however, cannot be denied, for we miss certain characteristic species such as *Cyclostoma elegans*, *Helicigona lapicida*, *Clausilia rolfii*, and even *Clausilia laminata*, which we are accustomed to associate with exposures of chalk when covered with ancient wood.

Some of the species which occur in the ravine are extremely numerous in individuals, and the surface soil under the leaves at the foot of Hubbard's Hill contains a prodigious assemblage of dead shells. To illustrate this it may be mentioned that on 23rd April 1902 I filled a two-pound sugar bag with this soil and by washing it obtained the following shells:—

<i>Carychium minimum</i> ...	... 52	<i>Vallonia pulchella</i> ...	... 13
<i>Hygromia rufescens</i> ...	... 10	<i>Buliminus obscurus</i> ...	... 1
<i>Hygromia hispida</i> ...	... 13	<i>Pupa cylindracea</i> ...	... 2
<i>Helicella itala</i> , juv. ...	... 2	<i>Pupa muscorum</i> ...	... 8

¹ For a detailed description of Hubbard's Valley, with plans, see Mr. Jukes-Browne's 'Geology of Part of East Lincolnshire' (Memoirs of the Geological Survey), 1887, pp. 127-130.

<i>Vertigo pygmæa</i>...	...	...	1	<i>Vitrea crystallina</i> ...	...	...	23
<i>Clausilia bidentata</i> ...	...	...	4	<i>Euconulus fulvus</i> ...	...	...	1
<i>Cæcilioides acicula</i> ...	...	...	1	<i>Limax</i> sp. ...	...	...	1
<i>Cochlicopa lubrica</i> ...	...	...	4	<i>Pyramidula rotundata</i> ...	...	...	4
<i>Vitrea cellaria</i> ...	...	...	1	<i>Punctum pygmæum</i> ...	...	...	4
<i>Vitrea pura</i> var. <i>margaritacea</i>	...	...	2				

A total of 147 specimens, besides a quantity of undeterminable fragments:

The following are particulars of all the forms as yet found in Hubbard's Valley, arranged according to Mr. Wallis Kew's 'Lincolnshire Non-Marine Mollusca,' published in 'The Naturalist,' in August 1902. Those marked with an asterisk are already known to inhabit the Valley, having been found by Mr. Kew and recorded by himself,¹ by Mr. Cockerell,² or by Mr. Roebuck.³

CARYCHIUM MINIMUM. Very plentiful among dead leaves in moist places.

*ANCYLUS FLUVIATILIS. Plentiful in the rapid parts of the stream; and in one of the springs.

LIMNÆA TRUNCATULA. A few taken from the stream.

*LIMNÆA PEREGER. A small form occurs in the stream.

PHYSA FONTINALIS. Found in company with *L. pereger*.

HELIX ASPERSA. Fairly plentiful. On 8th August 1902 I took a specimen on the grassy slope in the act of oviposition; 163 eggs were already deposited, and between the 8th and 11th of the month 23 more were laid in captivity, making a total of 186.

Var. EXALBIDA. A few specimens on the grassy slope.

Var. NIGRESCENS. A specimen approaching this variety, on 8th August 1902.

Var. UNDULATA. One specimen.

Var. FLAMMEA. A few.

*HELIX NEMORALIS. Fairly plentiful, and frequently seen crawling to considerable heights up the trees, especially the ash.

Var. MAJOR. One specimen + var. *libellula*, 123(45).

*Var. LIBELLULA. Fairly plentiful, the bandless form being most common.

*Var. RUBELLA. Not so common as the last.

Var. ALBINA. A few specimens on 31st August 1901.

Var. BIMARGINATA. Two specimens on 8th August 1902.

*HELICIGONA ARBUSTORUM. Very plentiful.

*Var. CONOIDEA. Two specimens, regarded by Mr. Cockerell as pertaining to this variety, were collected by Mr. Kew in 1885 at the foot of Fisher's Hill. Their measurements were about '6 in., maximum diameter '7 in.

Var. ALPESTRIS. Fairly plentiful; some are + var. *flavescens*.

*Var. FUSCENS. One on 28th July 1902.

*Var. FLAVESCENS. Plentiful with the type. Mr. Kew tells me that he used to find it by the pathway at the foot of Fisher's Hill.

Var. ALBINA. One in 1899.

¹ H. Wallis Kew, 'Naturalists' World,' III. (1886), pp. 41-3, 161-2.

² T. D. A. Cockerell, 'Naturalists' World,' II. (1885), pp. 221-3.

³ W. Denison Roebuck, 'Material towards a List of the Land and Freshwater Mollusca of Lincolnshire,' 'The Naturalist,' 1887, pp. 245-272.

*HYGROMIA RUFESCENS. Plentiful.

Var. ALBOCINCTA. A few.

Var. ALBA. Fairly plentiful.

Var. GLOBOSA. Three specimens were found in 1900-1. One of these was + var. *alba*.

HYGROMIA HISPIDA. Fairly plentiful.

*Var. HISPIDOSA. More common than the type.

Var. SUBRufa. A few.

*HELICELLA CAPERATA. Very plentiful, especially on the grassy slope, and frequently seen on Hubbard's Hill, crawling to considerable heights up the trees, especially the beech.

*Var. MAJOR. A single, fine example of this variety was taken by Mr. Kew on the grassy slope in 1885, and is noted by Mr. Cockerell in 'The Naturalists' World' for that year, p. 222. The diameter of the shell is given as '5 in.

*HELICELLA ITALA. Plentiful on the grassy slope. On 8th August 1902 I found here a sub-scalariform monstrosity.

Var. MINOR. Two specimens on 8th August 1902.

*Var. ALBA. Fairly plentiful with the type.

*Var. HYALOZONATA. Noted by Mr. Cockerell as having been taken by Mr. Kew on the grassy slope in 1885.

[HELICELLA VIRGATA. This species does not belong to the fauna of the valley. In the autumn of 1900, however, I placed about half a dozen specimens on the grassy slope in the hope of establishing a colony. Nothing was seen of them until the 12th of August 1902, when one of my sons found one on the grassy slope.]

VALLONIA PULCHELLA. Fairly plentiful among dead leaves.

*BULMINUS OBSCURUS. Very plentiful, and is frequently seen at considerable heights up the trees, especially the beech.

Var. ALBINA. This beautiful variety is fairly plentiful with the type, but owing to its habit of coating its shell with mud requires careful search.

*PUPA CYLINDRACEA. A few from dead leaves in moist places.

PUPA MUSCORUM. Fairly plentiful, but seems to prefer drier places than the last.

VERTIGO PYGMÆA. A few taken with *Pupa muscorum*.

*CLAUSILIA BIDENTATA. Very plentiful. More than 30 have been taken from one small tree stump.

Var. EVERETTI. Fairly plentiful.

CÆCILIOIDES ACICULA. Five or six dead specimens.

COCHLICOPA LUBRICA. Fairly plentiful.

*Var. LUBRICOIDES. A few specimens.

Var. FUSCA. One or two specimens from among dead leaves in moist places.

*VITRINA PELLUCIDA. Fairly plentiful among dead leaves in moist places.

VITREA CELLARIA. Fairly plentiful.

VITREA ROGERSI. Taken in 1885 by Mr. Kew on the wooded parts of Fisher's Hill, and determined at the time by Mr. Cockerell as '*Hyalina glabra*.'

*VITREA NITIDULA. Fairly plentiful, especially by the side of the stream.

VITREA PURA. A few.

*Var. MARGARITACEA. More plentiful than the type.

*VITREA CRYSTALLINA. Plentiful among dead leaves.

EUCONULUS FULVUS. A few.

- LIMAX MAXIMUS. Very plentiful, and frequently seen at night crawling about the tree trunks.
- Var. FASCIATA. Fairly plentiful.
- Var. FERUSSACI. One on 26th June 1902 on a beech tree.
- *LIMAX ARBORUM. Not uncommon about the beeches, on the trunks of which it is seen crawling at night.
- *AGRIOLIMAX AGRESTIS. Very much too common; unusually abundant during the last two summers, doing considerable damage to the turnip and mangold-wurzel crops in the neighbourhood.
- *Var. SYLVATICUS. Plentiful with the type.
- AGRIOLIMAX LÆVIS. A few, from among dead leaves in moist places.
- ARION ATER. Fairly plentiful. I have seen it feeding on the leaves of growing plants of ivy in the wood. Mr. Kew and I found an adult individual, of typical colour, on the grassy slope as early in the year as the 23rd of April, at which time we rarely see large examples in this district. On 28th August 1902, about mid-day, I observed two individuals in copulation. They were among the herbage in the hedge bottom at the foot of the grassy slope.
- Var. BRUNNEA. One or two.
- Var. SWAMMERDAMII. One specimen.
- ARION INTERMEDIUS. Fairly plentiful among dead leaves in moist places.
- *ARION HORTENSIS. Fairly plentiful.
- ARION CIRCUMSCRIPTUS. A few.
- *PYRAMIDULA ROTUNDATA. Very plentiful.
- Var. TURTONII. A few.
- *PUNCTUM PYGMÆUM. Fairly plentiful.
- SUCCINEA ELEGANS. Fairly plentiful on the herbage by the stream.
- SPHERIUM CORNEUM. A few in the more sluggish parts of the stream.
- PISIDIUM AMNICUM. Found with the last named.
- PISIDIUM PUSILLUM. Fairly plentiful in stream.

FIELD NOTES.

FLOWERING PLANTS.

Deschampsia discolor in Yorkshire.—Last August I observed a large quantity of a grass which seemed new to me, growing in a very wet bog on Skipwith Common, East Riding, V.C. 61; and I came to the conclusion it must be *Deschampsia discolor* Roem. & Schult. = *Aira setacea* Huds. = *A. uliginosa* Weihe. The name has recently been confirmed by Mr. J. W. White, F.L.S., of Bristol. The grass was spread over about an acre, and much of it was actually growing in the water. This species appears to have been recorded from only one spot in Yorkshire, viz., ‘Sparingly in very wet peat in the southern part of Thorne Moor,’ which is in the extreme east of the West Riding (V.C. 63) and due south of Skipwith. Though yet recorded from so few counties the range of this species in Britain appears to extend from Hampshire to Sutherland.—

H. STUART THOMPSON.

NORTHERN NEWS.

Mr. W. P. Westell records the occurrence of the 'Air' Bug (*Verlusia rhombea*) at Mablethorpe, Lincolnshire, in August last.

Dr. W. E. Hoye contributes to the January 'Journal of Conchology' an appreciation of the work of Isaac Cooke Thompson, F.L.S., who died at Liverpool last November.

A proposal is on foot to invite the British Association to visit York in 1906, when the Association will celebrate the seventy-fifth anniversary of its foundation. Its first meeting was held at York.

The Chief Librarian of the Hull Public Libraries has prepared a special card catalogue of the scientific and natural history works under his charge for the use of the members of the Hull Scientific and Field Naturalists' Club.

Under the editorship of Messrs. C. H. Hunt and J. J. Ogle is issued the 'Bootle Free Library, Museum, and Technical School Journal,' which contains various items of news of interest to those using the three Bootle institutions.

Amongst a lengthy 'List of New Mineral Names,' given by Mr. L. J. Spencer in the December 'Mineralogical Magazine,' we notice 'Anemolite,' as applied to a curved and upturned form of stalactite from the Derbyshire Limestone Caves.

At a recent meeting of the Entomological Society Mr. G. T. Porritt exhibited, on behalf of Mr. T. A. Lofthouse, a specimen of *Xylophasia zollikoferi*, taken near Middlesbrough in September (see 'The Naturalist,' December 1903, p. 456).

In an article on 'Our Coast Museums and their Zoological Treasures. I. The East Coast,' in the November 'Field Naturalist's Quarterly,' Mr. F. G. Aflalo deals with the Scarborough and Hull Museums, paying particular attention to the whales in the latter.

'Knowledge,' after 22 years' career, changes hands with the February number. It has amalgamated with the 'Illustrated Scientific News,' and will in future be issued by the publishers of the latter, under the title of 'Knowledge and Illustrated Scientific News.'

We regret to record the death of Mr. Robert Etheridge, F.R.S., which recently occurred at Chelsea, in his 86th year. Etheridge was the author of many important geological and palæontological works. In 1875 he edited the third edition of Phillips' well-known 'Geology of the Yorkshire Coast.'

Judging from the publications of the Leicester Literary and Philosophical Society that society is one of the very few of its kind that has not developed into a lime-light lecture society, but does conscientious work on the lines originally laid down by its founders. The total number of members and associates is now 333.

The Council of the Geological Society has awarded the Murchison Medal to Professor G. A. Lebour, of the Durham College of Science at Newcastle-on-Tyne, in appreciation of his labours amongst the Carboniferous rocks. Miss E. M. Wood, whose excellent work amongst the graptolites is well known, also receives recognition.

The Grimsby Education Committee having expressed its willingness to take over and maintain the Museum of the Grimsby and District Naturalists' Society, the Society has presented its collection of natural history specimens to the town. Mr. A. Smith, the Hon. Sec. of the Grimsby Society, has been given an appointment under the Committee.

At a recent meeting of the Entomological Society were two interesting exhibits from Great Salkeld, in Cumberland, made on behalf of Mr. H. Britten. These were: (1) a specimen of *Tropiphorus tomentosus*, showing the deciduous false mandibles intact; and (2) a female *Anchomenus parumpunctatus*, showing a malformation of the middle right tibia, which was abnormally thin, and bent in the centre, but thickened at the base; the right antenna also had the last seven joints flattened and dilated.

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MUSEUM, HULL;

TECHNICAL COLLEGE, HUDDERSFIELD.

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T. SHEPPARD, F.G.S., Museum, Hull.

PUBLICATIONS RECEIVED.

Animal Life, December 1903, January and February 1904.

Knowledge and Illustrated Scientific News, February 1904.

New Phytologist, January 1904.

Hull Trades and Labour Council Year Book, 1904.

Irish Naturalist, February 1904.

Zoologist, January 1904.

Nature Study, January and February 1904.

Entomologist, February 1904.

Halifax Naturalist, February 1904.

Nature Notes, February 1904.

Nottingham Naturalists' Society. Ann. Rep. and Trans. for 1902-3 (1904).

Hull Museum Publication No. 17 (7th Quarterly Record of Additions).

La Feuille des Jeunes Naturalistes, February 1904.

Ornithologisches Jahrbuch, January-April, 1904.

Zoologist, February 1904.

Lincolnshire Notes and Queries, January 1904.

Nautilus, February 1904.

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NOTES AND COMMENTS.

BRITISH REMAINS AT BROUGH.

Brough, on the Humber, generally attributed to be the *Petuaria* of Ptolemy, and unquestionably a station in Roman times in connection with the ferry across the Humber connecting the road from Lindum to Eboracum, was also occupied in British times. The absence of a specially constructed Roman road from Brough to York would seem to indicate that probably, as in other parts of the country, the Romans used a previously existing British track. Human skeletons, accompanied by vases, jet buttons, and objects of bronze and bone, have been

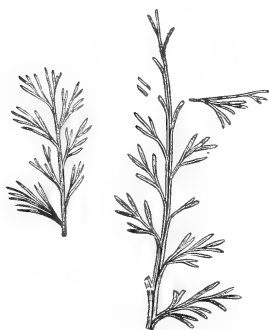


Bronze Dagger and Bone Pin.

found during excavations for gravel. The accompanying illustration, for which we are indebted to the Editor of 'The Antiquary,' shows a bronze dagger and bone pin, the latter found at the shoulder of the interment, and the former close by. The dagger is of a well-known type; the handle, as is usually the case, has decayed, though three of the four rivets for its attachment remain. The pin, however, appears to be different from anything of the kind hitherto found. It is made from a flat piece of bone, and has five circular holes bored at the flat end.

FOSSIL PLANTS.

Judging from the number of valuable monographs that have recently appeared dealing with fossil plants, it is obvious that the study of palæobotany is being followed at the present time in a manner that is most gratifying. Mr. Robert Kidston, the Chairman of the Yorkshire Fossil Flora Committee, who has

*Rhodea moravica.*

contributed most useful papers on the Carboniferous Vegetation of the County to the 'Transactions of the Yorkshire Naturalists' Union,' has recently presented a Memoir to the Royal Society of Edinburgh. It is entitled 'The Fossil Plants of the Carboniferous Rocks of Canonbie, Dumfriesshire, and parts of Cumberland and Northumberland.' In this the Carboniferous vegetation of the two areas is compared, the work being facilitated by the collection made in Northumberland and Cumberland by Mr. John Rhodes.

Tables of distribution and some excellent plates accompany the memoir, as well as a few illustrations in the text. One of these, representing a specimen of *Rhodea moravica*, is here reproduced by the courtesy of the Council of the Edinburgh Society. The specimen is from a shore section, west of Budle, Northumberland.

***Caucalis daucoides* Linn. in Yorkshire.**—This dainty little umbelliferous plant seems to be much more common and general in Yorkshire than the records indicate. Near the village of Flamborough it grows in abundance, though there is no record in the Flora of the East Riding for that district. In this neighbourhood it shows a preference for villages, and grows at Seamer, East Ayton, and Snainton, but in each case at the outskirts of the place—not in the intervening country. Still in other districts it grows far away from all houses, and though described as a 'colonist,' it looks very much like a native on the sandhills that line the North Cleveland coast, and on Grimbald's Crag, near Knaresborough. At York it had escaped observation till I pointed it out to some botanists from the Friends' School in Bootham, in a lane near Acomb. The plant is not difficult to discriminate. Its pale delicate leaves are already (20th January) developed, and when bruised exhale a pleasant aroma unlike the scent of any other plant of the same order.—W. C. HEY, West Ayton.

THE ACTION OF BACTERIA ON HIGHER PLANTS.*

GEORGE MASSEE, F.L.S., V.M.H., ETC.,

Kew.

ALTHOUGH the Bacteria or Schizomycetes are not included in the fungi, they hover around the fringe of this large group of plants, and the two possess certain important features in common, such as the absence of chlorophyll, hence they are either saprophytes or parasites, and their influence on life is very marked either for good or evil as the case may be. As an illustration of the influence of Bacteria may be mentioned the celebrated Harrogate waters, which, but for the work done by these minute organisms, would not exist. The Bacteria are among the most microscopically minute of living organisms, and one of the characteristic features of the group is the liberation of nitrogen, either in the form of this element, or in combination with hydrogen as ammonia.

Being so exceedingly minute, the Bacteria do not present that variety of form and structure presented by the so-called higher organisms, and are more frequently recognised by their mode of growth and behaviour under certain conditions of culture than by any structural peculiarities. Some Bacteria are characterised by the production of brilliant colours, others by the emission of odours agreeable or very much the reverse. Some again are aerobic, that is to say, they can only, like ourselves, live and have their being in the presence of free oxygen; others again are enabled to live and flourish in the absence of free oxygen, and are called anaerobic. These latter require oxygen quite as much as the aerobic forms, but are enabled to obtain the requisite amount from various substances containing this element in chemical combination. Finally, many Bacteria are chemotactic, that is, they are strongly attracted, or equally strongly repelled, by the presence of different substances in solution. Such substances need not necessarily be of a nutritive nature.

The above and other peculiarities illustrate the very varied conditions under which Bacteria can carry on their life-work, which consists mainly in breaking up complex chemical compounds, and liberating their constituents into the atmosphere

* Résumé of a discourse delivered at the Helmsley meeting of the Mycological Section of the Y.N.U.

as elements or simpler compounds. Amongst such, as already enumerated, are nitrogen and ammonia. Sulphuretted hydrogen from stinking fish or rotten eggs, and the phosphorescence of decaying fish on the beach also represent the work of Bacteria.

What are popularly known as 'germs' are Bacteria, but respecting the numerous ills man and other animals are heir to on account of their presence cannot be discussed here.*

To give an idea as to the rapidity of reproduction practised by the Bacteria, it may be stated that, in the comma bacillus or cholera germ, the time occupied is twenty minutes; hence it follows that an individual of this species would during the course of twenty-four hours under favourable conditions represent the starting-point of a progeny of sixteen hundred trillions of individuals, containing just over one hundred tons of solid residue.

This statement is perfectly correct, and nothing short of ignorance of the fact by the majority of people saves us from an additional special thanksgiving that conditions are rarely favourable for the above indicated rate of growth of the Bacterium.

The opinion universally held, until quite recently, that when manure is put in the ground its gradual decomposition is brought about by chemical and physical forces, until it is in a condition available for plant food, is now known to be incorrect, and is superseded by the proven fact that the decomposition of manure is due to the action of Bacteria. This statement is generally true, not only in the case of stable manure or 'muck-middens,' but also as regards the breaking up into an available form for plant food of such diverse substances as green crops when ploughed in, gas-lime, urine, and even the disintegration of rocks.

The method by which manure and plant-remains generally are rendered once more available for plant food by Bacteria have been thoroughly investigated, and takes place as follows, and illustrates a marked division of labour among these minute organisms.

* It is only necessary to briefly allude to the recent suggestion as to the possible existence of a specific mycological germ, with which it is necessary to be inoculated before a person can become a mycologist or fungus man. The distinguishing features of this germ are two—a marvellous power of discrimination, not more than from twelve to twenty persons out of forty millions proving to be susceptible. Secondly, its extreme pertinacity, one inoculation alone being sufficient to make a person a mycologist for the term of his natural life when efficiently effected.

The complete transformation is carried out in three stages :—

(1) The organic matter—manure—is broken up, and, among other substances, nitrogen and ammonia are liberated. The nitrogen escapes into the air, when a portion of it can be directly utilised by certain Bacteria, in a manner to be dealt with later. One of the most active of Bacteria engaged in this work is *Bacterium mycoides*.

(2) Next, a group of active workers known as Nitrite-Bacteria make it their business to convert the ammonia liberated by the work of the first group into nitrous acid.

(3) A third group of Bacteria convert the nitrous acid into nitric acid. Now this free nitric acid displaces other acids from their combination with either sodium or potassium, and takes their place, forming either nitrate of potash or nitrate of soda. Both these last-named substances dissolve in water, and are taken up by the roots of plants, and, broadly speaking, may be said to be the only two substances which directly furnish all flowering plants (except the pea tribe and a few others having tubercles on the roots) with the nitrogen they require.

The groups of Bacteria engaged in the formation of nitrate of potash and nitrate of soda, as described above, are collectively spoken of as nitrifying Bacteria ; and when we take into consideration the absolute necessity of nitrogen in some available form for the support and continuance of plant life on the globe, and, furthermore, the great cost of nitrogenous fertilisers, it will be seen how important it is to afford every opportunity of enabling those minute organisms to carry on their work, as on its continuance depends the very existence of all the higher forms of life on the earth.

All the nitrifying Bacteria are aerobic, or, in other words, require to be in contact with free oxygen. They are also very susceptible to water—a certain amount is necessary for their well-being, too much is prejudicial. An excess of free acid in the soil is also very injurious.

A fertile soil means the presence of nitrifying Bacteria living under those conditions which enable them to do the maximum of work. These conditions can be secured by good tillage, which secures the free access of oxygen to the soil ; good drainage, without which the soil cannot possibly be aerated ; and the neutralisation of all tendency to acidity or sourness by the free use of lime.

The use of artificial manures in which a considerable amount of free acid is present, is very injurious, as stated above, for the reason that acid actually checks the work of Bacteria. When such manures are once used their continuance becomes almost imperative, as the natural fertility of the soil, induced by Bacteria, is to a great extent destroyed, and the fertility of the soil, kept up by the use of artificial manures, is a costly process, and only justifiable in the case of rapidly-grown crops, as tomatoes, cucumbers, etc., where heat, temperature, fertilisers, etc., are brought to bear all at once to rush a crop. This, however, is horticultural gambling.

It has recently been shown that there is also present in the soil a group of organisms called denitrifying Bacteria, which exactly undo the work done by the nitrifying Bacteria. In other words, they decompose nitrates, setting free nitrogen, ammonia, etc., which escapes into the air, and thus for the time being cannot be used as plant food. These forms, however, are few in number as compared to the nitrifying Bacteria, and green plants consequently do not suffer materially from their activity, although under certain conditions manure heaps may be rendered almost useless owing to their presence.

Saltpetre or nitre (nitrate of potash), whether produced naturally as in certain parts of India, or artificially in a saltpetre manufactory, owes its origin to work done by a very minute Bacterium called *Nitrobacter*. This species is only about 0.5μ long, and, furthermore, is the only known living organism that can assimilate carbonic acid in darkness. Like the other nitrifying Bacteria it is aerobic.

The requisites for the production of saltpetre are the presence of decomposing animal remains, carbonate of potash, and moisture. The Bacteria first liberate ammonia from the organic remains; this is further converted by stages, first into nitrous acid, then into nitric acid. Finally the nitric acid takes the place of the carbonic acid in the carbonate of potash, and nitrate of potash, or saltpetre, results, a salt soluble in water and from which green plants can obtain nitrogen.

The enormous deposits of saltpetre met with in the arid region of Peru were not originally formed there, but carried in solution from the surrounding country, and left in a solid form after the disappearance of the water.

It has been known for ages that a crop of leguminous plants, as peas, beans, tares, etc., enriched the soil in which they grew;

the true explanation of this fact is, however, of recent date, and is now definitely known to be due to Bacteria.

These Bacteria are present in many fertile soils, and at quite an early age the root-hairs of the peas or beans, as the case may be, become more or less dissolved at the tip, and a certain amount of asparagin is liberated; this substance attracts the Bacteria—it is positively chemotactic—which enter the root-hairs, and pass upwards as a glairy stream into the young roots. When once within the roots the Bacteria rapidly increase in numbers and form the well-known knots or swellings so common on the roots of all leguminous plants. The Bacteria are at first supplied with an abundance of food in the form of carbohydrates, etc., by the plant in whose roots they are located, and they soon begin to absorb free nitrogen from the air; this nitrogen is stored up by the Bacteria to the proportion of six to seven per cent. by the time the pea plant is in bloom. Then the tables are turned on the Bacteria, and the pea or other leguminous plant in whose roots they have been hitherto provided with food, secretes certain substances which destroy the Bacteria, and the nitrogen they had accumulated is conducted to the young seeds of the host-plant. At this stage the nodules of the root that had sheltered the Bacteria decay, and certain of the younger Bacteria that escape destruction pass back into the soil, where they continue their work of accumulating nitrogen, and remain there until the young roots of another leguminous crop enables them to repeat the process described above. By this means not only do leguminous plants obtain nitrogen for their seeds at the expense of the Bacteria, but the latter also enrich the soil.

Now a German scientist, with an eye to the practical, saw money in this, and a manufactory was started in which pure cultures of the Bacterium of leguminous nodules, under the name of 'Nitrogin,' were produced wholesale, and sold to farmers for the purpose of augmenting their crops of peas, beans, etc. The Bacteria are supplied in little glass tubes, and are mixed with water and spread over the land. It is stated that the manufacturer profited by the transaction more than the farmer. Nevertheless, the experiment was correct in theory, but the proper practical application remains to be discovered. It is a well-known fact that soils notorious for their inability to grow a crop of leguminous plants, will do so if a certain amount of soil, taken from a district favourable for the growth of legumes, is scattered over the sterile ground. This change is owing to

the introduction of the necessary Bacteria to the previously sterile soil.

Such phrases as 'clover-sick,' 'beet-sick,' etc., applied to land that fails to produce a crop, has been proved to be owing to the temporary absence of the specific Bacterium necessary for the growth of the clover or beet, and that when this organism is reinstated vigorous growth of the crop is assured.

In concluding my remarks on soil Bacteria, it may be stated that careful researches have proved the presence of these organisms in fertile ground, in both tropical and temperate parts of the world; in fact, the presence of vegetation implies their presence also.

On the other hand, remembering that sourness, excess of water, or exceptional compactness of the soil prevents the indispensable Bacteria from performing their functions, it only remains for the practical man to modify such detrimental conditions, and thus render fertile many thousands of acres of land which at the present moment will not support a goose per acre. It is not necessary to go outside England to demonstrate the truth of this statement.

Having thus far held a brief for those Bacteria who unconsciously promote our welfare in the ways indicated, it is equally important to call attention to other members belonging to the same group, whose actions, except to the person whose frame of mind enables him to see 'good in everything,' will be viewed with suspicion. I allude to those Bacteria causing plant diseases.

Until quite recently it was generally held that the vegetable kingdom was exempt from the prejudicial influence of Bacteria. This idea has unfortunately proved to be wrong, recent investigations, mainly conducted by American scientists, having definitely proved that not a few epidemics of a serious nature attacking cultivated plants are caused by Bacteria. Among such may be enumerated the following, which, along with others, have been observed in this country:—

BACTERIAL DISEASE OF POTATOES.

This disease so far as Britain is concerned, was first recorded from Easingwold, Yorkshire, where it was quite prevalent during 1902. In the United States it is a very destructive disease, attacking potatoes, tomatoes, and egg-plants. The earliest sign of attack is the sudden wilting of the leaves, followed by a shrinking of the haulm, which soon droops and dies. If

a diseased haulm is split open dark brown lines corresponding to the vascular bundles are seen. These dark lines are due to the vessels being crowded with Bacteria, which produce a brown coloration.

The disease follows the vascular bundles down into the underground parts of the stem, and thence into the tubers, where it first shows as a pale brown, irregularly broken zone at a little distance from the outside. This coloured zone, which corresponds to the ring of vascular bundles in the potato, becomes blackish-brown as the Bacteria increase in number, and spreads toward the centre; finally the potato becomes rotten, and the Bacteria are liberated in the soil, where they remain until another crop of potatoes are planted.

The leaves or upper portion of the stem are first inoculated, and this is effected by minute beetles and other insects, which feed alternately on diseased and healthy plants. The Bacteria also live in the soil. The most certain preventive is spraying the crop with Bordeaux mixture to which an insecticide, say Paris green, is added. Lime has a retarding influence on the Bacteria present in the soil. It is also advisable to discontinue planting potatoes for some time in land that has produced a diseased crop.

HYACINTH BACTERIAL DISEASE.

This peculiar disease, so far as is known, is confined to hyacinths. Infection occurs in the leaves or flowers, the germs being carried by insects. The infected portion is restricted to the vascular-bundles, the parenchymatous portion of the plant being too acid for the development of the Bacterium. When once infected the disease follows the vascular-bundles of the leaf or flower-stalk into the bulb, its course being marked by clear yellow streaks. Daughter-bulbs produced by an infected bulb are also infected, the disease passing from parent to offspring along the vascular-bundles. Bulbs that are diseased do not produce flowers.

The Bacteria pass from the diseased plants into the soil, where they are capable of existing for a long time; hence ground that has produced a diseased crop should in future be avoided for hyacinth culture, unless it has been thoroughly sterilised by the use of gas-lime or other substance.

Tomatoes, Swede turnips, and certain conifers are also attacked by Bacteria, and in almost every instance infection is effected by means of insect agency in the first instance.

In the case of a bacterial epidemic it is of primary importance to prevent, as far as possible, the dead parts of affected plants from decaying on the ground, otherwise the germs become liberated in the soil, where they are capable of remaining for an almost indefinite period of time, and a recurrence of the disease is practically certain.

Burning is the only safe method of disposing of infected plants, and sterilisation of the soil where such plants have grown is a wise precaution to take.

NOTES ON THE POTAMOGETONS OF SIR J. E. SMITH'S HERBARIUM WHERE LOCALISED FROM YORKSHIRE.

ARTHUR BENNETT, F.L.S.,

Croydon.

FINDING that Smith's specimens give at least two species not on record for the county of York, I thought it would be of interest to Yorkshire botanists to put in print a few notes respecting them, because, although mentioned in *Top. Bot.*, ed. 2, 1883 (from my notes), no explanation is given, or *acutifolius* named as an accepted Yorkshire species in either of the three floras that treat of the county, i.e., Baker's 'North Yorkshire,' Lees' 'West Yorkshire,' or Robinson's 'East Riding Flora.' I take the specimens as they occur in his herbarium.

'*P. heterophyllus* Schreb., Lips. Sheet 5.

P. palustre Teesdale.

No. 1. Ditches in the marshes near Beverley. Mr. Teesdale, 1794. No. 10. Correct.

Two other specimens so named are *P. angustifolius* Bertch and Presl. (*Zizii*). This adds another species to Mr. Robinson's 'Flora of the East Riding,' V.C. 61. (I possess a specimen of this gathered by Mr. and Mrs. Cotton, June 1884, from Scarborough Mere, V.C. 62.) An addition to North Yorkshire. So far as I know there is no record for *Zizii* in Yorkshire.

On a separate label '*P. palustre* foliis inferioribus submersis lanceolati membranaceis sessilibus superioribus ovali-lanceolatis petiolatis coriaceis natantibus. Mr. Teesdale. In ditches in the marshes near Beverley.

See *P. fluitans*, Hoff. Fl. Germ., which, however, it cannot be.'

Sheet No. 11 (three specimens).

'1. Ditches in marshy ground near Beverley. Mr. R. Teesdale.

**fluitans*, Roth ex descrip.

P. fluitans, Eng. Bot., V. 18, t. 1286.'

These are *P. alpinus* Balb. = *P. rufescens* Schrad.

Sheet No. 19 (three specimens).

'2. Beverley, Yorkshire. Mr. R. Teesdale, 1798.

"*P. gramineum*" = *P. obtusifolius* Mert. & Koch.

Sheet No. 20 (five specimens).

One of these, marked '2' is labelled '*P. cuspidatus*, Fl. Germ.' 'Germany, Schrader.' This specimen is *P. acutifolius* Link.

Three other specimens are from 'Beverley, Yorkshire. Mr. R. Teesdale. July 1798. "*P. compressus*." These are *P. acutifolius* Link., and are named '*compressus*' in Teesdale's paper in the Trans. Linn. Soc., II., 106, 1792. The other specimen is *P. zosterifolius* Schum. from 'a rivulet, Hovingham.' So that the record of *zosterifolius* from 'Baines' Flora' (there under the name of *compressus*), in the 'Flora of the East Riding of Yorkshire,' p. 195, needs altering to *P. acutifolius*. This gives the V.C. 61 for that species, and it was that to which my note referred; the record of 62, N.E. York? "reported," I do not know the source of, unless it was a confusion with the Ripon Flora report.

Sheet No. 24 (four specimens).

1. Near Beverley. Mr. Teesdale.

1. This is different to the *P. pusillum*, and yet it does not agree with the description of the *P. setaceum* as Linn.! says 'fols. *oppositis*,' adding, 'in this plant the upper leaves are only so.'

Three specimens of *P. pusillus* L. in no way different to the ordinary plant.

Sheet No. 28 (four specimens).

'2. Ditches near the sea, Yorkshire. Mr. R. Teesdale. 1794. No. 11. *P. pectinatus* Fl. Brit.'

Is *P. pectinatus* L.

Sheet No. 31 (one specimen).

'In salt water ditches at Hornsea. I have always considered this as different from the others in the same way. It is well figured in 'Vaill,' t. 32 (I believe fig. 3).'

* In a different handwriting.

Is *P. pectinatus* L. f. *pseudo-marinus* Ar. Benn. = f. *salina* Voch.

There is a record of *P. acutifolius* Link in Mr. H. H. Slater's 'Flora of Ripon,' 1873; but Dr. F. A. Lees, in his 'Flora of West Yorkshire,' says, 'Should be looked for, very doubtful.'

I may here correct an error in the 'Flora of Skipton,' p. 38, 1900. *P. prælongus* Wulf is there recorded from the 'Canal at West Marton.' I asked Mr. Rotheray to kindly send me the specimens, and they proved to be *P. perfoliatus* L. I was much disappointed, as the species seems to be very rare in Yorkshire. Mr. Watson queried both V.C. 62 and 63, and gave 64 as an error.* But Mr. Backhouse recorded it from Malham Tarn as found on the 11th of July 1844. 'A high wind ruffled the waters of the tarn, and brought considerable quantities of *Potamogeton lucens*, *perfoliatus*, and *prælongus* to the shore.' Phyt., Vol. I., p. 1126, November 1844. This is the only station in the county I have seen specimens from. Mr. Baker has no record in North Yorkshire, saying, p. 385, 'The Gormire plant is erroneously given as *prælongus* in Supp. Fl. Yorksh.' It is an early flowerer (May and June), and then sinks to mature its fruit; and in July and August must be 'dragged' for in deep water.

In the Comp. Cyb. Britt., p. 344, Watson says of *prælongus*, 'Low grounds'; yet in the Cyb. Britt., Vol. III., he says, 'the altitude of that tarn (Malham) is said to exceed 1,200 feet.' Of late years it has been gathered at 2,500 feet near Killen, Perth (Macvicar sp., 1893), and from Meall nan Tarmachan, Perth, at 2,500-3,000 feet (Messrs. Dixon and Valance sp.).

Although now generally accepted as two species *P. zosterifolius* and *acutifolius* were formerly made one species (i.e., by Røemer and Schultes, Mant. V., III., Sys. Veg., p. 362, 1827). No two species could be more unlike in constitution (if I may use the word), *acutifolius* is an early flowerer, often in the first week in June with well-formed fruits, rarely at this time with barren stems, while the other is a late flowerer (July and August) and with abundant barren stems. There are very few good figures of the fruit of *acutifolius*; the best is Reichenbach's in his Fl. German et Helv., Vol. VII., 1845. The length of the peduncles in this must not be relied on too much; I have seen French specimens with these 1 inch in length, and a variety from Mandshuria with them 1½ inches long.

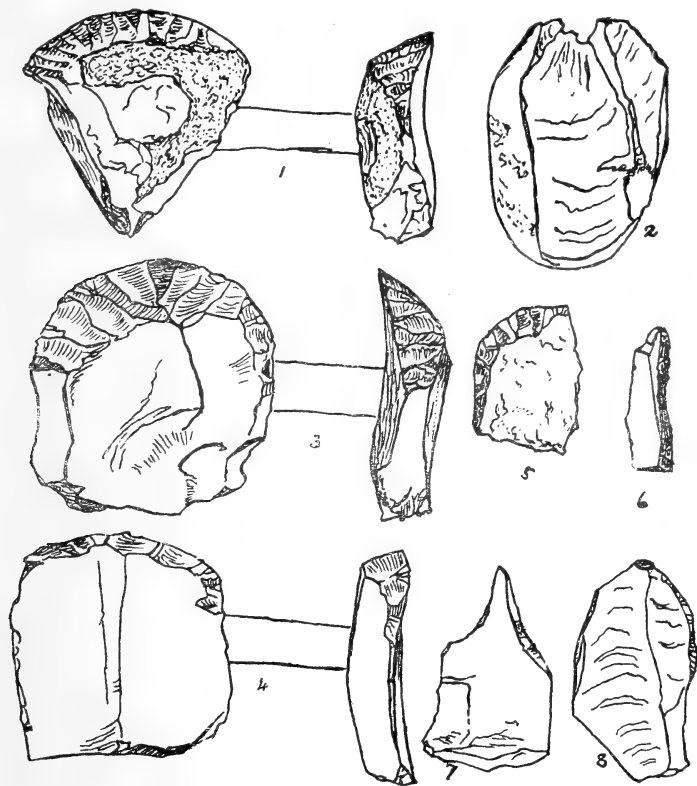
* Yet in Cyb. Britt., Vol. III., 17, 1852, accepted it.

NEOLITHIC REMAINS IN SOUTH DURHAM.

C. T. TRECHMANN,

Castle Eden.

PREHISTORIC remains are undoubtedly scarcer in the county of Durham than in the adjacent counties of Yorkshire and Northumberland. It is therefore perhaps worth while recording the occurrence of flint implements on the Durham coast a few miles north of Hartlepool. On the north side of the stream which



Flint Implements from the Durham Coast

runs through Crimdon Dene, and about three miles north of Hartlepool, are some high banks of glacial drift partly covered up with blown sand ; in certain patches where the sand has been removed we came across many broken flint pebbles, rough chippings of flint, and one good scraper (No. 1). All were

lying on the exposed clay and sand, which was blackish in colour in some parts.

The scraper is rather unusual in form, being roughly triangular, with secondary chipping on one edge only; it is made of dark brown flint, and is glazed and slightly bleached from exposure.

Flint chippings may be traced all along the coast to the mouth of the next large gorge, that of Castle Eden dene; but there are some ploughed fields just above the Black Hall rocks which have yielded rather interesting results. The soil here is light and sandy and apparently very fertile. The relics found comprise many flint cores or so-called sling-stones, broken pebbles, flakes, a few well-made scrapers (Nos. 3, 4, 5), a few flakes trimmed round the edges, apparently intended to do duty as knives (No. 8), one or two borers (No. 7), and one quite small implement (No. 6). None of the fine implements, such as occur on the Yorkshire Wolds, were found; in fact, the series resembles much more the implements found on the Scotch coasts, and was probably made under similar conditions. The flint is generally yellow or pink, and taken from rounded pebbles (No. 2) found either on the seashore or in the glacial drift. The flint in many cases has been partly burnt and cracked by fire.

Since implements are not found inland in the neighbourhood, we may conclude that the sites are simply those of 'kitchen middens,' or dwellings of the Neolithic inhabitants who settled along the coast, attracted, no doubt, by the abundance of provisions to be obtained on the seashore.

Between Seaton Carew and West Hartlepool there is a kitchen midden (now covered up) of later date, in which Roman remains and several broken pieces of flint have been found mixed with many bones and shell remains.

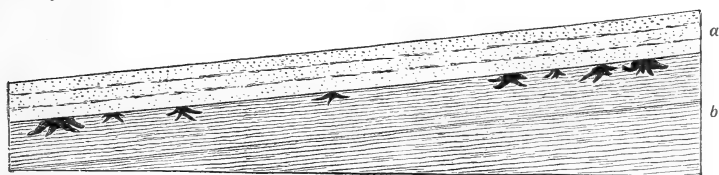
Probably such remains could be traced at all likely spots along the coast of Durham and Northumberland. We have also found traces of flint chippings at Rhyhope, Marsden, and near Monkseaton, in Northumberland. Canon Greenwell records the opening of a tumulus on the cliffs near South Shields.

EXPLANATION OF FIGURES.

1. Scraper. Mouth of Crimdon Dene.
2. Split pebble of yellow flint. Black Halls.
3. Scraper in pink flint, bleached white by exposure. Black Halls.
4. Scraper, bleached white. Black Halls.
5. Scraper in yellow flint (a very small example). Near Black Halls.
6. Small implement in grey flint. Black Halls.
7. Borer in pink flint. Black Halls.
8. Knife in grey flint. Black Halls.

THE SHEFFIELD MEETING OF THE YORKSHIRE NATURALISTS' UNION.

THE 42nd Annual Meeting of the Yorkshire Naturalists' Union was held at Sheffield—Sorby's city—by the invitation of the Sheffield Naturalists' Club, on Friday, 29th January 1904. A fair number of members arrived in the forenoon to examine the fossil trees exposed on the asylum grounds at Wadsley and were conducted round by Dr. W. S. Kay, the superintendent. From a paper appearing in the 'Quarterly Journal of the Geological Society,' August 1875, entitled, 'On the Remains of a Fossil Forest in the Coal Measures at Wadsley, near Sheffield,' by Dr. H. C. Sorby, it appears that these trees were originally exposed in the autumn of 1873. They occur in the Coal Measures, sandstone, and shale, and fortunately have been protected by sheds and can consequently be readily examined. The accompanying block illustrated Dr. Sorby's paper, and has been kindly lent by the Council of the Geological Society.



Section showing the Position of the Stumps in the Fossil Forest at Wadsley.

a. Sandstone. b. Clay-like shale. (Scale: 1 inch to 40 feet.)

An interesting point in Dr. Sorby's paper is the fact that a careful examination of the roots of the trees resulted in their furnishing evidences of the direction of the prevalent winds at the time when they grew.

At about two o'clock the members began to assemble in the Public Museum and Mappin Art Gallery, which had been kindly placed at their disposal by the Corporation of Sheffield, and proved a most admirable suite of rooms for meetings of this kind.

At the Sectional Meetings various officers for the year were recommended and elected at the General Meeting. The formation of a new Committee of Suggestions for Research was of interest, including as its first members representatives of various other Committees of the Union, with Mr. P. F. Kendall as chairman, and Dr. W. G. Smith, as convener.

Excursions for 1904 were arranged as follows :—

For York Mid W.—Buckden, 3rd September (Saturday).

For York S.E.—Spurn, July (week-end, 2nd to 4th).

For York N.E.—Harwood Dale, Whit-week-end (21st to 23rd May).

For York N.W.—Dent, August Bank Holiday (1st August).

For York S.W.—Hebden Bridge, 9th June (Thursday).

Fungus Foray, Upper Teesdale.—24th to 29th September.

Mr. P. F. Kendall presided at the General Meeting and the usual discussions took place. With regard to the finances, it was found that the position of the Union had improved, the normal expenditure of the year being much below the current income, and it is hoped that by the next Annual Meeting a very satisfactory state of affairs may be reported.

Much time was saved by the tea being held in the Art Gallery, after which the General Meeting of the Union was held. When the formal business had been conducted, the Presidential Address of Mr. W. Denison Roebuck, F.L.S., entitled, 'Salient Features in the History of the Union,' was read by Mr. E. Howarth. It was pointed out how great the influence of the Union had been in the scientific welfare of the county during recent years. During the delivery of the address Alderman W. H. J. Brittain, J.P., F.R.G.S., the Chairman of the Museum at Sheffield, and an old member of the Union, occupied the chair. Votes of thanks were subsequently passed to the Sheffield Corporation, the local Naturalists' Club, Alderman Brittain and others for their assistance in securing the success of the meeting.

From 8.30 p.m. until a late hour the time was pleasantly and profitably occupied in attending a conversazione which had been arranged by the members of the Sheffield Naturalists' Club in the Art Gallery and Museum. In addition to various forms of entertainment there were many interesting exhibits which had been brought together for the occasion by the members of the Union and local naturalists. Some of these were of an exceptionally interesting character. The albums of geological photographs were also on view. The absence of Dr. Sorby was keenly felt, and members generally expressed the opinion that he might speedily recover from his accident and be with them again.

The next Annual Meeting will be held at Leeds. T. S.

The Slaithwaite Naturalists' Society and the newly formed Hull Co-operative Field Club have affiliated themselves with the Yorkshire Naturalists' Union.

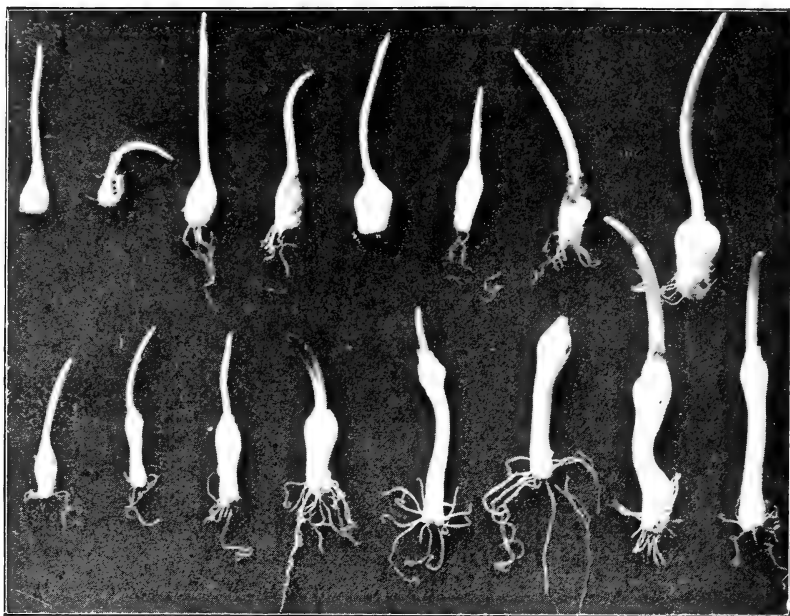


Fig. 7.—Elongated Bulbs of Bluebell.



Fig. 8. Bluebells in a Sycamore-Elm-Beech Wood.

NOTES ON THE BLUEBELL.

T. W. WOODHEAD, F.L.S.,
Technical College, Huddersfield.

(Continued from p. 48.)

MANY bulbs were found much elongated in form, some measuring two to three inches in length, and throughout the greater part not more than $\frac{1}{4}$ inch to $\frac{3}{8}$ inch thick (Fig. 4, c and d). Commonly they taper from above downwards, forming a shape very suggestive when considered in connection with the function of the contractile roots. In July the base of the bulb still further enlarges, but does not equal the apex in diameter.

In a section of an elongated bulb at this period (Fig. 4, d) the scale leaves are seen to be thickened, especially at the base and tip, the inner being tubular, and enclosing the foliage leaves.

A long series of bulbs was obtained, from small globular to much elongated forms. Plate V., Fig. 7, shows a selection of these. The first external sign of elongation is a shallow annular constriction near the base. This is the region of active growth in which the lower portions of the leaf bases are mainly concerned. From very numerous observations of bulbs under cultivation, as well as in the woods, we find that the upper swollen part of the bulb is not forced upwards during elongation, but downwards. In addition to this we have the action of the contractile roots, the lower portions of which are firmly fixed in the soil by their root-hairs* (Fig. 5, a and b). Here we have an interesting example of response to environment, the bulbs being stimulated according to their position relative to depth, air and light, being 'endowed with irritabilities by means of which they grow through the substratum . . . like true roots.'† Ultimately the requisite depth is attained, but in the meantime changes have begun towards the formation of a typical globular bulb.‡

I have not as yet been able to obtain a complete series from elongated to rounded bulbs, but by comparison of wild forms

* Kerner and Oliver, Nat. Hist. of Plants, Engl. Transl., Vol. I., p. 770, and Scott and Sargent, Development of *Arum maculatum* from the seed, Ann. Bot., 1898, p. 399.

† Sachs, Ibid., p. 62.

‡ Areschoug, Bietrage Biol. d. Geophilen pflanzen, Lunds Universitets A'rs-skrift, 1895, XXXI., p. 107; Rimbach, Das Tiefenwachstum der Rhizome, Bietrage z. Wiss. Bot., 1898, p. 177; and Oliver, Depth in the Soil at which Plants Occur, Journ. Roy. Hort. Soc., 1898, p. 486.

with cultivated ones the change seems to be brought about as follows. One by one the long outer scale leaves die (Plate V., Fig. 7, Specimens 2, 4, and 7), the inner younger ones are shorter and thicker towards the base. Thus gradually the bulb becomes more uniform in thickness, though for some time the upper part exceeds the base in diameter.

At this period (July) bulbs are commonly supposed to be 'resting,' but such is not really the case. The bulb scales contain a store of reserve material, which, as shown by Parkin,* is inulin, starch occurring only in minute quantities towards the apex of the axis. Within the bulb changes are going on, in preparation for the renewed growth of roots so evident at the end of July and during August.

This activity continues throughout September, when the new bud for the following spring enlarges considerably, and by the middle of December may have sent up leaves three or four inches out of the bulb.

These are now seen to be surrounded by two specially modified scale leaves which are thin, colourless, and tubular. They closely ensheathe the foliage leaves in such a way as to form a smooth outer covering which keeps the leaves compact, and so enables them to push their way through the soil without injury (Fig. 7, b tu.1). On nearing the surface in January the green leaves elongate more rapidly, push their way through the apex of the inner sheath and gradually expand (Fig. 7, c). The outer sheath by this time extends some two inches above the bulb, the inner one being about two inches longer. In the younger bulbs only one sheathing leaf is formed. Fig. 7, e, shows a section of the sheath surrounding a single leaf, and there is still but one sheath even in bulbs with four or five foliage leaves. Outside these are four or five true scales, tr.s.

Vertical sections of bulbs at this period show interesting phases of adventitious root development. These arise from the solid stem in considerable numbers and have to make their way through the fleshy scale leaves. Fig. 7, a, shows a section of such a bulb with numerous roots boring through the scales. Fig. 7, d, shows the tip of one of these, surrounded by the large cells of the scale. The cells immediately around the tip are

* Parkin, Depletion of Carbohydrates in Monocotyledons, *Phil. Trans. B.*, 1899, p. 35. See also Keegan, Chemistry of some Common Plants, *Naturalist*, 1903, p. 229.

NOTE.—The reserve materials in the seed consist largely of proteid granules, not starch.

undergoing digestion, the contents of which are absorbed by the developing root. The root literally eats its way out to the soil. To the right of Fig. 7, a, is seen a small bulb arising in the axil of a scale leaf. Even this bulb is sending out roots, which are eating their way through and feeding upon the scale leaves of the parent. Roots often pass obliquely upwards on their way out, and emerge high above the base of the bulb. The outer scale leaves eventually become deprived of their nutrient materials and rapidly decay, thus the young bulbs are liberated and afterwards lead an independent existence. Three or more buds are often found in the bulbs all pushing their leaves up together in the Spring.

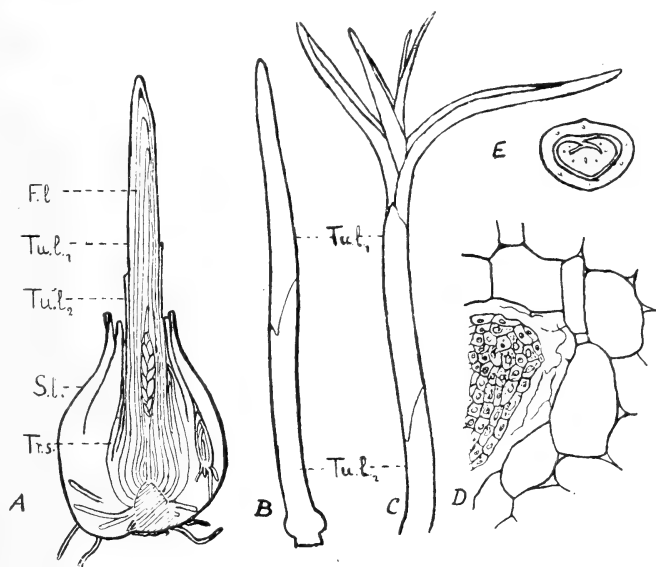


Fig. 7. a, mature bulb; b, scales removed to show sheathing leaves; c, foliage leaves emerging from sheath; d, root tip surrounded by partly digested cells of bulb scale; e, young foliage leaf surrounded by single sheath.

A longitudinal section of an elongated bulb (Fig. 4, d) shows that the outer scale leaves are fused for a considerable distance, consequently when buds arise in their axils, they stand at a much higher level than those formed in the axils of the inner leaves.

The bluebell furnishes us with an excellent example of a geophyte, a plant which carries on a considerable part of its activities underground. At all times of the year some work is

going on, and although much of it is hidden from view, a study of this underground history constitutes one of the most interesting phases in the life cycle of the plant.

Having seen that the bluebell may propagate itself, not only by its seeds but by bulbs (and this accounts largely for its social habit as a species), it becomes a matter of some interest to inquire into its distribution over a definite area. The material for this study was obtained in Birks Wood, about three miles to the south-east of Huddersfield. It forms part of the northern limit of extensive woodlands known as Woodsome Woods, which lie mainly on the Grenoside rock and on shales between this sandstone and the Elland Flagstone of the Lower Coal Measures.

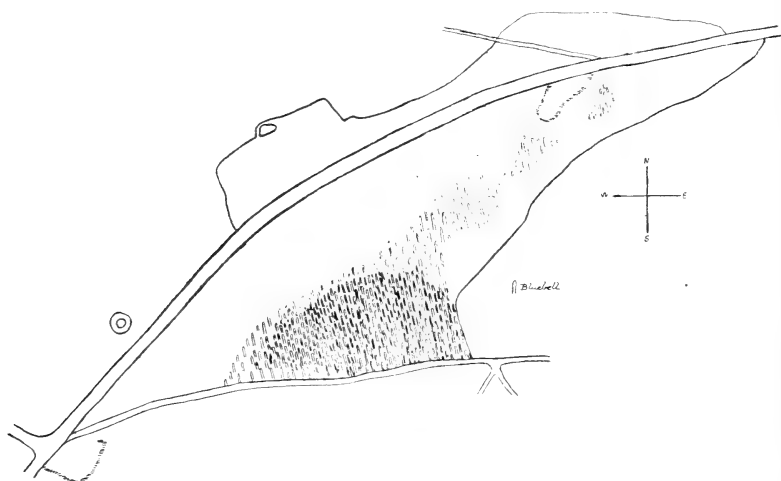


Fig. 8. Map of Birks Wood showing distribution of bluebell.

As indicated in the diagram (Fig. 10) the wood faces north-west, its slope and altitude are shown by the contour lines, the highest point is nearly 500 feet above sea level, descending to 350 feet along the road. Near the middle of the wood is a tiny stream arising from a small spring above, it marks the western boundary of a bed of clayey loam, and disappears below in the sandstone at st. Another small stream is shown to the east.

The details were worked out on the 25 inch to the mile Ordnance Survey map, and Fig. 8 is a plan of the wood reduced, on which the distribution of the bluebell is shown. In the south-east corner, as indicated by the darker symbols, the plant occurs in great abundance. To the north and east it thins out and soon disappears.

Fig. 9 is a tree map. The shaded areas show the distribution of shade trees, chiefly sycamore and elm. The unshaded

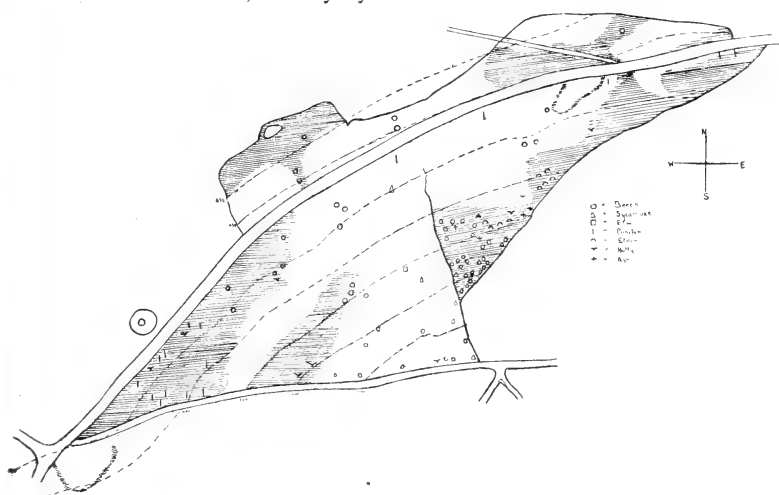


Fig. 9. Distribution of trees in Birks Wood.

part consists of trees with an open canopy, mainly oak. Individual trees of other species are indicated by symbols. On comparing the two we find that while the bluebell grows in

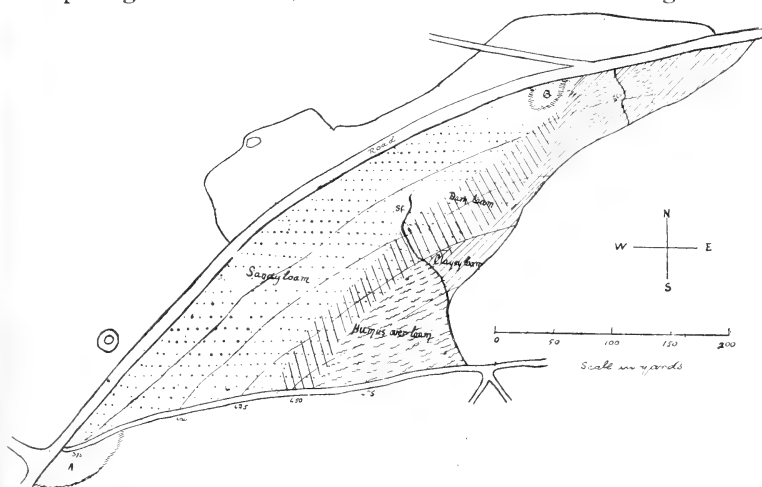


Fig. 10. Soil map.

abundance in one part of the oak area, it is absent in others. The species of overshadowing tree, therefore, is not the sole or even the main factor in its distribution.

Fig. 10 is a soil map of the same wood. The details were obtained by a method suggested by Mr. P. F. Kendall. An augur was used $1\frac{1}{2}$ inches in diameter and with a six-inch thread to which iron rods were screwed, so that borings from four to five feet in depth could be made. A section of the soil in the dense bluebell area is indicated in Fig. 11. On the surface are three to four inches of leaf mould, below this four to six inches of peaty humus resting on a slightly sandy but firm loam, followed by clayey loam and stiff clay below. Along the northern edge humus is very thin on a dark sandy loam, the trees along

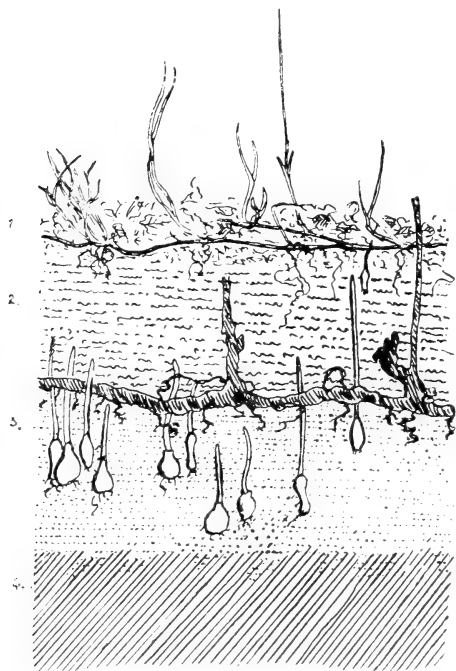


Fig. 11. Section of soil in dense bluebell area, bulbs deeply buried.

this edge being chiefly elm and beech. To the north-east humus is absent, a clayey loam rests on a stiff clay, becoming slightly more sandy with humus in patches to the east. The rest of the wood, to the north and west, has a somewhat shallow sandy soil, with little or no humus. This is a soil lying immediately above a bed of Elland Flagstone quarried in two places, one to the east, the other to the extreme west (Fig. 10, a and b).

An interesting feature is brought out when the soils, together with the contained plants, are compared in areas where the blue-

bell is dense, and where it thins out. In the vertical section of the soil in the dense area we find that the loose leaf mould on the surface is occupied by the rhizomes of *Holcus mollis*; they are practically confined to this layer, sending out fibrous roots from their nodes, which penetrate to some extent the upper part of the peaty humus. This humus may be called the bracken layer, for in it the rhizomes of this fern ramify, often keeping to the junction between it and the yellow loam below into which many of its root fibres grow. Young bulbs of the bluebell may be seen in this layer on their way downwards. Their final home, however, is in the firm loam.

These three plants, *Holcus mollis*, bracken, and bluebell, practically constitute the flora of the undergrowth in this area, other species being quite subordinate. Superficially they may be thought to be in severe competition with each other, each striving for mastery over its neighbour. Such, we see, is not the case, we have instead a little association of species living in concord. Their soil requirements, their modes of life, their periods of active vegetative growth, their times of flowering and fruiting are all different. In many respects, therefore, each species is not within the sphere of influence of the other, and they flourish apace. Competition, such as it is, goes on between individuals of the same species.

The trees, as we have seen, are chiefly oak, and as the bluebell is up early, drawing upon the rich store of food reserves in the bulb, its foliage leaves are well advanced before the oak is in leaf, and therefore suffers little from overshadowing. When the bracken fronds unfold, their deep shade together with the shade of the trees in leaf, affects to some extent the late assimilatory activity, and so acts as a competitor.

Let us now consider the conditions in the area where the bluebell thins out and ultimately disappears. In comparing this area with the distribution of the trees, we see it is not entirely a question of light, as its distribution is not co-extensive with the oak area, that is, with trees with an open canopy. We find that several factors are concerned. An examination of the soil and plants in the thin area, of which Fig. 12 is a diagrammatic section, presents rather interesting features. There is little or no leaf mould or humus, and the soil for the greater part is a stiff sticky clay. In this area occur among other species yellow dead-nettle, dog's mercury, and arum, and though some of the rhizomes lie near the loose material above, their long fibrous roots grow deeply into the soil. Here, too, are numerous root

branches of small trees, between which we find bulbs of the bluebell tightly packed. To this extent these plants are in competition, all striving to occupy the same layer, though the bluebell often manages to penetrate deeply in spite of the stiffness of the soil. Another factor is the overshadowing of the trees, for here we have a shade area consisting of beech, elm, sycamore, and low growing elders. These eventually form, together with the soil conditions as noticed above, a barrier to the bluebell.

To the north and west is an oak area, but here the bluebell is absent. This seems to indicate that the sandy nature of the soil constitutes a barrier to the plant. This view is strengthened by comparison with the millstone grit oak woods in the district, for in these areas where the soil is shallow and sandy the bluebell is either very sparingly distributed or entirely absent.

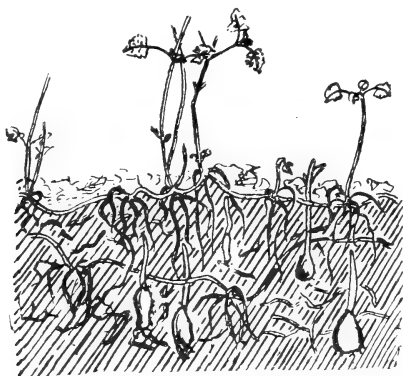


Fig 12. Section of soil where bluebell thins out, bulbs nearer surface.

In woods, however, where soil conditions are favourable, we find if one or two well-grown beeches occur together, or if this species is dominant, the bluebell thins out, flowers badly, and generally presents a most unhappy appearance. Still it can withstand a considerable amount of shade, and thrives well under a mixture of sycamore, elm, and beech. The photograph (Plate V., Fig. 8) was taken for me by Mr. J. Bruce in such an area in Woodsome Woods, where in the spring many acres are covered by unbroken sheets of blue.

In the course of this work I have received much help from Miss H. M. Sikes in the collection and examination of bulbs, and in the preparation of wood maps; from Miss Bertha Lomax in the preparation of sections, and she and Mr. J. Kyle have rendered valuable assistance with the illustrations.

I also wish to record my indebtedness to the Earl of Dartmouth for kindly granting permission to work in his woods.

SCHIZOPHYLLUM COMMUNE IN EAST YORKSHIRE.

W. N. CHEESMAN, F.L.S.

Selby.

SCHIZOPHYLLUM COMMUNE Fries is a rare fungus in England, it is indigenous to tropical countries, but is occasionally found here on imported logs.

Berkeley says, 'I have seen this beautiful plant in profusion on foreign wood, but I have never gathered truly British specimens, which are extremely rare.' Mr. Crossland has kindly furnished me with the following Yorkshire records :—

1. Selby, 1878. In timber-yard. Dr. H. F. Parsons, Y.N.U. Trans., Pt. II.
2. Steeton, 1886. On timber in wood-yard. W. West and H. T. Soppitt, Nat., February 1886.
3. Liversedge, 1886. On imported timber, L. & Y. Rly. station. Rev. Wm. Fowler, M.A.
4. Hebden Bridge, 1894. On dead sycamore trunk. J. Needham.
5. Keighley, 1903. On hickory logs from Nova Scotia, in timber-yard. Thos. Hebden.

The fungus grows from half to two inches across, of an ashy-grey colour, thin and leathery, and with a slightly downy or hairy surface. It is more or less fan-shaped, and attached by a short side stem. Beneath, the gills radiate from the stem and have split edges, which character marks the genus *σχίζω* I split, and *φύλλον* a leaf.

A cross section shows the very curious revolute form of the split gills.

About a month ago my little daughter found in a wood-yard here two or three small stunted specimens on an elm log, and yesterday she brought home a handful of fine large plants with the news that they were as plentiful as *Stereum hirsutum*. I hurried to the spot and found several ash logs literally covered with the fungus. The timber merchant informed me that he had not a single foreign log in the yard, all being locally grown timber, and the particular logs bearing the fungus were grown in a wood in the parish of Hemingbrough, in the East Riding.

I made a visit to the wood to-day and searched high and low on the trees for the fungus without success, but at last found an old ash log (one of the original felling, about two years ago) which, being too far decayed to be worth removal, was left behind. This was bearing a fine crop of the *Schizophyllum*, apparently in full vigour and health, and unmistakably indigenous in this its first recorded East Riding station. Massee notes in 'The Diseases of Plants,' p. 207, that it is said to be parasitic on the sugar cane in the West Indies, and that one observer records it as a parasite on the mulberry tree, but from my observations I am inclined to think it is more of a saprophyte than a parasite, as it is nearly always found where the bark is in its early stage of decay.

I shall be pleased to send a few specimens to any of our readers on receipt of addressed envelope.

COCKROACHES IN THE NEIGHBOURHOOD OF BARNSELY.

E. G. BAYFORD.

IN September last I learned that a very large Cockroach had been taken at Hoyland Common (about five miles from Barnsley). As soon as convenient I went over to see it and at once saw that it was a very interesting importation. Having had it in my care for a little time I was able to determine it to be

RHYPAROBIA MADERÆ F. The specimen, a fine female, measuring 38 mm. in length with an expanse of wing of 90 mm., was taken alive amongst a lot of onions on 10th September by Mr. George Dyson at the place mentioned, and is now in that gentleman's possession. The species 'has been frequently taken in London' (Stephens, Ill. Brit. Ent. Mand., VI. 44, 30th June 1835). Two specimens taken in Covent Garden Market, one in 1894, the other in 1895, are finely figured in the 'The Entomologist' for June 1896, but I am not aware of any northern record.

PHYLLODRONIA GERMANICA L. The first specimen of this species which came under my notice was brought to a meeting of the Sheffield Naturalists' Club in March last by one of the members, who told me it was abundant in a grocer's shop

Naturalist,

there. Since then I have received a specimen taken in Barnsley. The statement is frequently repeated that this species was 'imported by the soldiers returning from the Crimea in 1857.' Sufficient proof of the inaccuracy of this is the fact that Stephens (l.c., p. 46) placed it amongst the indigenous species (a position he denied to *S. orientalis* L.), although he says 'it is extremely doubtful whether this insect be really indigenous: I feel inclined to decide against its admission, as it appears to be confined, at least in this country, to dwellings and warehouses; and it unquestionably occurs, not uncommonly, in merchant vessels.'

STILOPYGA ORIENTALIS L. Undoubtedly an introduced species; is now too common everywhere.

In addition to these I have a specimen of each of three imported species. Through the kindness of Mr. Malcolm Burr, F.E.S., to whom they were sent for identification, I am enabled to say that one of these, which was found amongst bananas imported from Jamaica, is '*Heminictobora truncata* Sauss,' a species 'recorded from Mexico and Guatemala.' My specimen, a wingless female, when alive had an indescribably curious attitude when still, altogether different from that of any species with which I am acquainted, reminding one of a toad at bay. In this posture the pads between the claws were very conspicuous. Mr. Burr considers it 'probably immature,' and adds, 'the femora are redder than in the types which I have examined.'

Owing to the other two specimens being immature, Mr. Burr is unable to do more than assign them to the genus *Epilampra*, which he tells me 'is a difficult genus with a large number of species, which are hard to discriminate even in the adult.'

With regard to these two specimens it may be of interest to note that one of them, a wingless female about the size of our common *S. orientalis*, but dark testaceous, covered with minute black granulations, was found alive in a box of tomatoes imported from Teneriffe in 1887.

The other, a much smaller species, with the entire lateral margins of the abdomen, and all the margins of the thorax except the basal one, livid testaceous, oddly enough was taken alive in the room of the Barnsley Naturalists' Society early in 1903.

FIELD NOTES.

BIRDS.

Occurrence of a Night Heron in Cumberland.—A fine immature female Night Heron (*Nycticorax griseus*) was found dead on Grinsdale Island, near Carlisle, on 10th December 1903. This is the second example of this species which has occurred near Carlisle during the last three years. Both birds are now in the City Museum at Tullie House.—T. L. JOHNSTON, Carlisle.

Food of Barn Owl.—On 30th December 1903 a live Barn Owl was sent in a basket to our local taxidermist. Whilst in the basket it had cast up a 'pellet' of undigestible matter which was given to me. After macerating and carefully examining it, I found remains of five Common Shrews—four skulls, five pairs of lower jaws, and numerous other bones.—C. S. CARTER, Louth.

Black Redstart at Teesmouth.—When near the North Gare Breakwater (on the Durham side of the Tees mouth) on 28th October 1903, and following up a single Shore Lark, I noticed a Black Redstart perched on some heaped up slag, which was secured after a short chase. It is an immature male, lacking the white mark on the wing, and, so far as I am aware, is the first obtained at the Tees mouth. On 9th November a female example of the same species was seen between Seaton Carew and West Hartlepool.—C. E. MILBURN, Middlesbrough.

The Tree Creeper in North Lancashire.—Lately in reading Mitchell's 'Birds of Lancashire,' 1892, Ed. 2. by Howard Saunders, I was struck by the following passage:—'It is not common in the Preston district, and in Furness, according to W. B. K., Mr. W. A. Durnford's informant, it occurs but rarely,' p. 59. On 4th February, last, I saw one almost in the town of Ulverston, on a wall, searching amongst a mass of hypnum, and a pair frequently come and hunt over a moss-covered wall at the side of my house. An inquiry to Mr. W. Duckworth, of Penrith, to whom the birds of the lake area are well known, brought the information that he had seen the species in the outskirts of Ulverston and at Conishead. He writes, 'It is always thinly scattered amongst the older woods,' and mentions its occurrence in the Colton and Rusland districts, where such conditions obtain. The 'W. B. K.' above was a Mr. Kirby, long since dead. He was a competent observer, and had a very fine collection of eggs. Later in the season I

hope to see the species hunting amongst some of the old trees about my house. The tits have begun already.—S. L. PETTY, Ulverston, 12th February 1904.

FLOWERING PLANTS.

***Hyoscyamus niger* at West Ayton.**—In May 1896 an old wall bounding my garden at West Ayton was pulled down to its foundations, and some dry, dusty soil, full of bones, was thrown out from beneath the foundations. I saved a little of this soil and watched it, and in a few weeks a number of plants of the Common Henbane appeared, a plant I have not seen nearer Ayton than Flamborough Head, some twenty miles away. In the following summer the plants bloomed profusely, and were left to ripen their seed. Strange to say, not a single seedling has ever appeared. I believe the seeds from which the plants sprung must have been buried under the wall at least a hundred years, perhaps much longer. That no seedlings grew up as the progeny of these plants makes one wonder what conditions interfered with the growth of seeds that can retain their vitality for a century under a wall.—W. C. HEY.

***Juncus tenuis* at Bootle.**—On the 29th of September 1903 I came across *Juncus tenuis* Willd. in my churchyard (St. Mary's, Bootle). The plant has been verified by Mr. Arthur Bennett. It is the first record for the county. It is a strange plant to find in a town churchyard in the midst of a dense population. The soil is suitable for it, being moist and sandy, and it can hardly be an introduced plant.—Rev. W. WRIGHT MASON, Vicar of St. Mary's, Bootle, 27th January, 1904.

FUNGI.

Fungi in Potridings Wood, South Yorkshire.—On 18th October last Mr. W. N. Cheesman and myself paid a visit to Potridings Wood near Conisborough, with the object of again turning up *Chlorospora Eyrei* Mass., the great find of the 1901 foray. However, although we spent upwards of an hour in searching on the exact spot where that and so many other interesting fungi were then found, not a sign of the green-spored species was to be seen. The larger fungi are often strangely inconstant in their appearances. We may have been a little too early or too late, or the season (although so favour-

able to most fungi) may not have suited this species, perhaps through the lack of warmth. We were, however, rewarded by one find of great interest, viz., *Mycena rorida* Fr. This most beautiful and somewhat rare Agaric was found by Mr. Cheesman growing in some quantity on dead bramble stems; it is at once distinguished by the stem being covered with glistening transparent jelly-like gluten, especially round the middle and at the base where it sometimes accumulates in a large drop. In appearance the species, with its decurrent gills and beautifully crenate margin, has quite the appearance of an *Omphalia*. The only previous Yorkshire record appears to be Scarborough (G. Massee). Another species noted was *Clitocybe nebularis* (Batsch.), among dead leaves under beeches.—THOS. GIBBS, Sheffield, 13th December 1903.

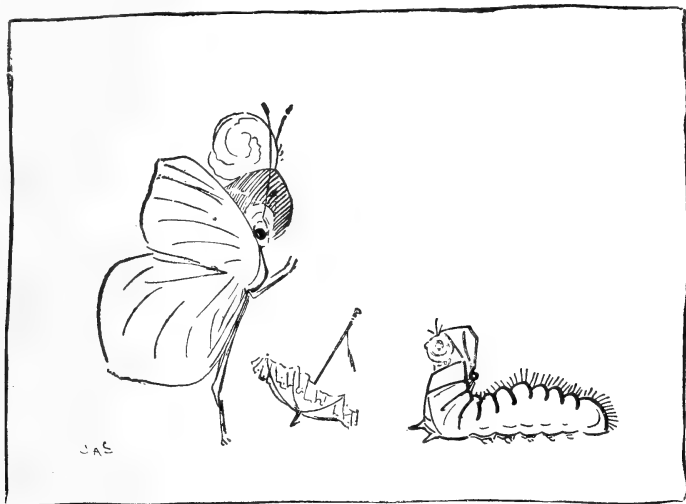
ORTHOPTERA.

***Rhyparobia maderæ* at Bradford.**—Recently, Mr. J. W. Carter gave me two specimens of orthoptera which had been taken in an orchid house at Bradford. One of them is an example of the fine *Rhyparobia maderæ*; the other a very pretty bright pale green *Panchlora*, but the exact species of which I have as yet been unable to get determined. Of *R. maderæ* Mr. E. G. Bayford has also an example, captured at Hoyland Common, near Barnsley; and both it and the *Panchlora* are hitherto unrecorded for Yorkshire. Both species are mere casuals in Britain, and have no doubt been imported with fruit, plant roots, or something of the kind. A few have occurred in the London district, chiefly about Covent Garden Market.—GEO. T. PORRITT, Huddersfield, 6th February 1904.

REVIEWS AND BOOK NOTICES.

A New Theory of Organic Evolution. By J. W. Barclay. Blackwood & Sons, 1903. 3s. 6d. net. 174 pp. In this work the author proposes 'to test by the common sense that Huxley says is science, whether the Darwinian doctrine, that the evolution of life on our planet was brought about by natural selection and other secondary causes, accords with ascertained facts . . . and, also, to submit a new theory that will explain satisfactorily the admitted facts of evolution.' Mr. Barclay, however, will not secure the serious attention of scientific men to his 'New Theory,' which is a form of the 'special creation' hypothesis. His ignorance of many elementary natural phenomena is perhaps not altogether unexpected.

Mr. J. A. Shepherd has long been known to the public from his inimitable sketches of animal life from the humorous point of view. The 'Arcadian Calendar,' by E. D. Cuming and J. A. Shepherd, has just been issued by George Newnes, Ltd. (6s. net), and is full of most amusing sketches, illustrating animal life in various phases. The letterpress is arranged in



'Mamma.'

seasons, and almost every page in the 200 comprising the book has a characteristic sketch. One of these, entitled 'Mamma,' is reproduced herewith by the kindness of the publishers. The book can be strongly recommended to naturalists and others, and will not fail to amuse.

An account of some Anglo-Saxon and Mediæval antiquities recently added appears in the seventh 'Quarterly Record of Additions to the Hull Museum' (Publication No. 17. A. Brown & Sons, Hull. One penny).

'The Fifty-first Annual Report and Transactions of the Nottingham Naturalists' Society,' for 1903-4 (published 2nd February 1904), has just been received. It contains papers of general interest ('The Erect Posture' and 'The Domesticated Microbe'), and one referring to a far-off country ('Iceland and its Volcanic Phenomena'). Unquestionably the most valuable contribution is the only one of local interest, viz., 'Nottinghamshire Crustacea and Arachnida,' by Prof. J. W. Carr. Whilst this list may not be read by the same number of people that will peruse the other contributions, we cannot but feel that the report would have had more value had it contained more local matter.

NORTHERN NEWS.

At a recent meeting of the Thirsk Naturalists' Society, Mr. R. Lee reported the occurrence of six Rough Legged Buzzards at Silton, near Thirsk, during the first fortnight in January. The keeper shot four, and has two alive still.

1904 March 1.

The new President of the Royal Microscopical Society is Dr. D. H. Scott, F.R.S.

Mr. J. E. Marr, M.A., F.R.S., whose excellent work on the geology of the Lake District, etc., is well known, has been selected as President of the Geological Society of London.

The 'Halifax Naturalist' for February contains 'Local Records in Natural History, 1903,' by various contributors. The part also includes an instalment of 'The Flora of Halifax.'

A Great Spotted Woodpecker, which has been under observation for some months in Hangingstones Wood, near Huddersfield, has been shot, and taken to Mr. C. Mosley 'for preservation'!

What is said to be a record cod was landed at Grimsby by the trawler 'St. Lawrence,' 11th February, and measured 49 inches in length, 32 inches round the shoulders, and 9 inches round the tail.

With the issue of No. 1 of 'Knowledge and Scientific News,' the column devoted to 'British Ornithological Notes,' hitherto conducted in 'Knowledge' by Mr. H. F. Witherby, is to be discontinued.

We regret to record the death of Mr. Angus Macpherson, of Redcar, which took place early in February. Mr. Macpherson has been a member of the Yorkshire Naturalists' Union since 1888, and has always taken a great interest in natural history.

Dr. D. H. Scott has an interesting article on 'Germinating Spores in a Fossil Fern-sporangium' in the 'New Phytologist' for January. The specimen described was obtained by Mr. J. Lomax in February 1903, and is cut from a nodule from the Halifax Hard Bed.

'Nature Study in a Leeds School,' by the Head Master, and 'Nature Study: the Equipment of the Teacher, and its Co-ordination and Co-relation with other School Subjects,' by J. B. Branson, appear in the January and February 'Nature Study,' respectively. The latter paper was read at the Nature Study Conference, held at Beverley in November last.

Mr. A. H. Pawson, J.P., F.L.S., F.G.S., of Leeds, has accepted the presidency of the Yorkshire Naturalists' Union for 1904, on the invitation of the Executive Committee of the Union. Mr. Pawson is a well-known Yorkshire naturalist, and takes particular interest in botany and geology. His charming contributions to 'The Naturalist' will be familiar to our readers.

The January 'Zoologist' contains the following records of interest to our readers:—A Lesser Shrew at Ackworth, the Great Grey Shrike in Cheshire, Ferruginous Duck at Ackworth, and the Great Skua in the Isle of Man. Mr. T. H. Nelson gives a note from the forthcoming 'Birds of Yorkshire' relating to the 'White-Spotted Bluethroat obtained at Scarborough in 1880.'

Owing to the progress made by the Keighley Museum during the past three years, it has been found necessary to appoint an Assistant Curator. The post has been given to Mr. George Rose, late of Barnsley, a well-known and successful breeder of lepidoptera. A new insect room is to be fitted up, and while making it interesting and instructive to teachers and the general public, we understand that Mr. Mosley intends to carry on some experimental work in Entomology.

'Vestiges of the Celts in the West Riding,' is the title of a valuable paper in the 'Bradford Antiquary' (the journal of the Bradford Historical and Antiquarian Society), Part 8, 1903, edited by Prof. Federer. The author is Mr. J. H. Rowe, who gives a useful summary of the evidence of the early occupants of the district. The same journal has other interesting papers by Messrs. S. O. Bailey, W. Cudworth, C. A. Federer, H. Speight, T. T. Empsall, and James Parker, though they hardly come within the scope of this journal. The Editor's 'Story of the Turvin Coiners' is a most readable description of these famous forgers.

Naturalist,



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NOTES AND COMMENTS.

A LINCOLN MUSEUM AT LAST!

At a meeting of the Lincolnshire County Museum Committee, held recently, an application was received from the municipality of Grimsby, for the transfer to them of the specimens in the possession of the Committee, at Lincoln. The applicants pointed out that they now had funds for the purpose, a museum building, and a curator; and would pay the cost of transfer of the specimens. It was announced, however, that the Lincoln Corporation had undertaken to repair and alter the Grey Friary at Lincoln, and were willing to spend, within the next twelve months, the sum of £1,500 in preparing the upper chamber and crypt for the purposes of a Museum. Whether as a result of the Grimsby application or not, it must be most gratifying to all who are connected with Lincolnshire to learn that a County Museum is at last to be established in its capital. The pity is that this were not done long ago. Not one, but hundreds of most valuable objects—antiquarian, geological, and natural history have left the county for ever, when a proper Museum might have retained them. We noticed in a recent publication of a Yorkshire Museum, an account of the acquisition of some most valuable Roman Mosaic pavement, vases, etc., found in Lincoln, but which are now permanently housed across the Humber. The people of Lincoln ought never to have allowed the removal of these relics. There are, however, still scores of suitable objects in Lincoln and around, which will no doubt find their way to the new County Museum.

THE BRIDLINGTON 'CRAG.'

The so-called Bridlington 'Crag,' which for nearly twenty years has been hidden from the reach of geologists, is just now being exposed in connection with the erection of a new sea-wall. When first described it was considered to be a deposit in situ, beneath the boulder-clay, and was therefore referred to the Crag series of Norfolk and Suffolk. Mr. G. W. Lamplugh, however, demonstrated that the shelly patches were fragments torn up from an old sea bottom, which had been transported and included in the boulder-clay, in the same way as boulders of harder materials. The patches now being exposed in the excavations are found to occur in irregular patches in the Basement

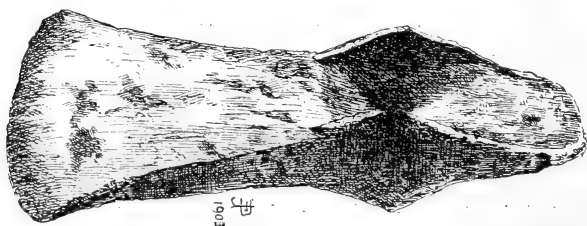
boulder-clay, and have yielded several shells of an Arctic type, a tooth of a Shark (?), etc. In addition to a collection of shells, a large quantity of material has been secured for careful examination, the result of which will appear in due course.

A NEWSPAPER PARAGRAPH.

As an example of the 'scientific' information sometimes appearing in the daily papers, the following extraordinary effusion from a 'Bridlington Geologist,' relating to the shell beds, may be quoted:—'I think it is most probably the lower green sand found in the lower cretaceous (neocomian) strata. This is sometimes termed by geologists the "Neocomian group," but for all practical purposes chalk gault and green sand are identical. The gault is a provincial term for a blueish tenacious clay, and with it are found beds of green or ferri-genous (sic) sands. The green colouring is due to the presence of chloritic matter, but these sands are not uniformly green, having sometimes yellow tints. The chalk forms the upper group of the system. The fossils comprise sponges, foraminifera, corals, crustacea, fishes, star fishes, reptiles, and plants allied to the algæ confedoa (sic), etc. I have several which I got from the Speeton clay. If the workmen dug out two or three characteristic fossils it would settle what I will only now speculate upon; but I dare say that I am right—that this is the lower green sand of the chalk in the lower cretaceous strata, which you see so well developed up to Sewerby Bight.'

UPPER COQUETDALE ANTIQUITIES.

A very complete and accurate account of the Neolithic and later antiquities of Coquetdale appears in Mr. D. D. Dixon's wonderfully cheap volume on 'Upper Coquetdale,' recently

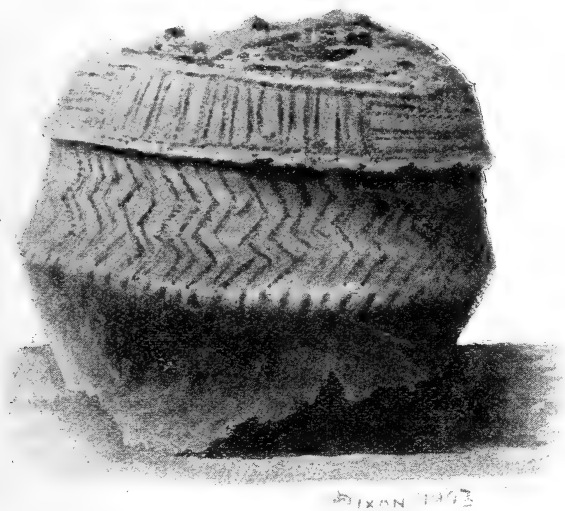


Bronze Axe from Tosson Burgh.

issued. The various earthworks, implements of stone and bronze, earthenware vessels, etc., are described in detail, and in many cases figured. The district appears to be particularly rich in relics of the Britons. A recent 'find,' a bronze palstave, or flanged axe, from Tosson Burgh, is here figured. These are, however, not the only objects dealt with by Mr. Dixon. The Mediæval history, fauna and flora, etc., all receive attention.

AN ANCIENT CINERARY URN.

Amongst the earthenware vessels is the cinerary urn figured herewith, found in a tumulus near 'Willie's Cairn,' in the township of Great Tosson. In the centre of the mound was a cist, which had contained the primary burial. Four feet to the east of this was the urn, inverted on a flat stone, on the natural



An Ancient Cinerary Urn.

surface of the ground. In addition to the cremated human bones, the vase contained a flint implement, three inches long, and some fragments of another vase. The 'herring-bone' ornamentation on this vase is characteristic of the British period. Other vases were found in the same mound. We are indebted to the publisher, Mr. R. Redpath, of Newcastle, for the loan of the blocks.

LINCOLNSHIRE FRESHWATER MITES.

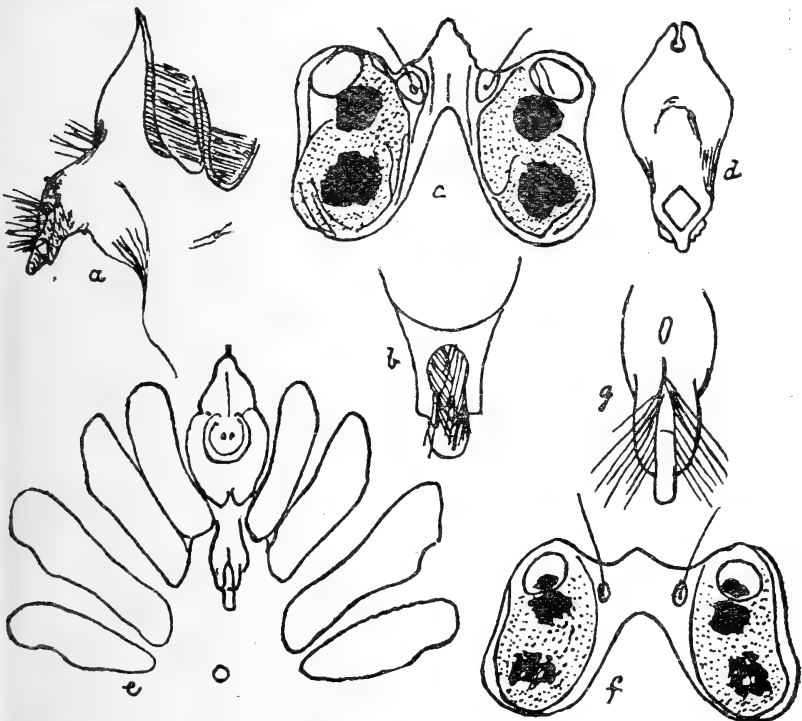
C. F. GEORGE. M.R.C.S.

Kirton-in-Lindsey, Lincolnshire.

Eulais Latr. This family has for the last seven years excited great interest, and is still being very closely studied in different parts of the world. The name was given by Latreille to a mite described by 'Müller' in 1776, under the name of *Hydrachna extendens* (see 'Zoologiæ Danicæ prodromus,' page 190, No. 2272), the specific name being derived from the fact that when the creature swims the hind legs are extended backwards, and not used for swimming; this is a characteristic of the whole family. For a length of time there was supposed to be only one species. In 1837 Koch figured and described five. These were not differentiated with sufficient clearness to be identified, and were again supposed to be really the same creature. However, in 1896, Kœnike pointed out certain anatomical differences not before observed, which excited so much interest, that in a short time many new species were described by various observers. Hence Piersig was able to describe no less than 35 species in 'Das Tierreich' (published in 1901), and since that time a considerable number have been added to these, South Africa and South America contributing. Indeed, this family is evidently to be found in tolerable abundance all over the world, new species frequently turning up, the eyes and their setting being the portion chiefly figured, that being the part where so many and such remarkable differences are to be found; the palpi also in some cases are useful as assisting in diagnosis. It seems rather strange that, notwithstanding all these minute observations, and skilled observers, no one excepting Kœnike seems to have figured the external sexual organs of the male. On looking over a few specimens preserved in fluid I found three differing greatly from the rest in structure. These were evidently males, there being a well-formed penis in the situation where in the female there is a simple slit. This organ is of considerable size and can be easily dissected from the mite. It differs considerably from the figures by Kœnike, and from the male organ of any water mite I have yet examined. I sent one specimen to Mr. Soar, who kindly drew from it the figures *e*, *f*, and *g* accompanying this paper. He looked over his mounts of *Eulais* and found two slides showing the penis, and from these he drew the figures *a*, *b*, *c*. Figure *a* is a side view and gives a good

Naturalist.

idea of the organ as it appeared to me, and to my mind it suggested the idea of what a highly-ornamented mediæval pump spout might have been; figure *d* is a poor effort of my own to draw a front view. It will be seen that there is a sort of flange or scutcheon where the organ is attached to the body skin, and the projecting portion has in front, near the distal end, a diamond-shaped figure, which appeared to me to be an



Dissection of *Eulais*.—*a*, side view of penis; *b*, *d*, *g*, front view of penis; *c*, eyeplates of Mr. Soar's specimen; *f*, eyeplates of my specimen; *e*, under side of mite, showing relative positions of capitulum, penis, and epimera, from my specimen, before dissection.

opening. This was surrounded by a considerable number of rather long and fine hairs, not drawn in this figure, but may be seen in figure *a*; below this in the centre is a blunt projection, and on either side, but not on the same level, is another rather pointed projection, shown in figures *a* and *d*. Mr. Soar gives the length of the penis as 0.38 mm. Figure *e* shows the arrangement of the epimera, the capitulum, and the situation of the penis; figure *f*, the eyes and eye-plate from my specimen; and figure *c* the same parts from Mr. Soar's. It will be seen

that they differ somewhat from each other, but I am not prepared to say that they are distinct species. In 'Zoologischen Jahrbüchern' for 12th March 1900, will be found figures of the external male organs of *E. schauinslandi* Koen. and *E. infundibulifera* Koen. I have met with one specimen very like the last.

In Piersig's List in 'Das Tierreich,' I find of the 35 species described, in 17 the male is said to be unknown. There is therefore much work to be done before a complete monograph of this family can be written.

REMAINS OF THE LION IN EAST YORKSHIRE.

THOMAS SHEPPARD, F.G.S.,

Hull.

FOR some time considerable interest has attached to the peat deposit at Hornsea on account of the alleged discovery therein of remains of the Lion (*Felis spelæa*) in association with the Red Deer, Irish 'Elk,' Horse, *Bos primigenius*, and Mammoth (?). Attention was first drawn to the matter by Mr. Clement Reid, in his 'Geology of Holderness,'* where, in a list of remains from the Hornsea deposit, *Felis spelæa* is included, on the strength of a specimen or specimens in the Hull Museum. Mr. Reid states that a curious point is brought out by his list. 'It shows that some of the extinct Pleistocene mammals, including *Felis spelæa* and perhaps *Elephas primigenius*, are true Post-glacial species, not confined to the North of England, as has been stated, to inter-glacial beds.'† Further on, under the head of 'Post-glacial Natural History of Holderness,' Mr. Reid again refers to the Lion at Hornsea.

On examining the collection of mammalian remains at the Hull Museum, a metatarsal bone $5\frac{3}{4}$ inches long, labelled as

* 'Geological Survey Memoir,' 1885, p. 82.

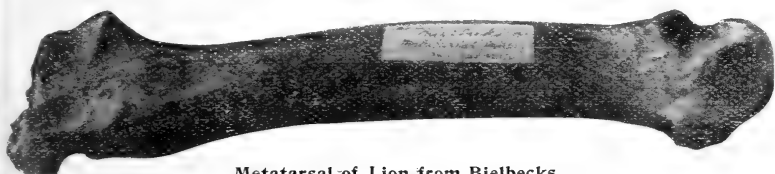
† With regard to the Mammoth, Mr. Reid adds, 'Unfortunately, though several teeth of the Mammoth have been found at Hornsea, it is not quite certain whether any of them really belong to this deposit, so it must still be left doubtful whether the species really lived in Holderness in Post-glacial times.' In the opinion of the present writer, no remains of the Mammoth have ever been found in the peat deposits of Holderness. Teeth, etc., have certainly been seen on the peat, which is exposed on the beach at different places, but they are beach-worn, and have been derived from the glacial beds, just as have the boulders found along with them. In the same list Mr. Reid includes '*Bos primigenius* (?) (Hull Museum).' The '(?)' can safely be removed, as there are remains of that animal in the Hull Museum, not only from the peat at Hornsea, but from other Post-glacial deposits on the Holderness coast.

from Hornsea, was noticed, and on communicating with Mr. Reid he informed me that this was the bone referred to in his Memoir. It had evidently been examined by Mr. E. T. Newton, palæontologist to the Geological Survey, as a slip of paper was attached to it with the following in his handwriting:—

‘Right Metatarsal of Lion (*Felis spelæa*).’

Another paper was gummed round the bone upon which was similar information.

On the occasion of the recent visit of the Yorkshire Geological Society to Hull I was asked to exhibit and describe a few of our more interesting geological specimens, and for this purpose the bone in question was taken from the case, where it had probably rested, undisturbed, for nearly twenty years. A much-needed wash resulted in a most fortunate discovery being made. The label, in an unknown handwriting, gummed round the bone,



Metatarsal of Lion from Bielbecks.

came off, and revealed yet another. This was in the plain hand of John Phillips, as follows:—

‘*Felis*. Bielbecks, W. Metatarsal, inner on right side.’

With this label the evidence of the Hornsea Lion was lost, to the great relief of local geologists.

The manner in which Clement Reid was misled is easily accounted for. In the first place the bone is of a dark colour, similar to those from the peat, and it was placed in a case which contained several Deer, etc., bones from the Hornsea peat bed, as well as mammalian remains from the Bielbecks deposit, near Market Weighton. Being a small bone, it was put on a narrow shelf, together with some small bones from the peat, for in the old days the *size* of a specimen had much to do with its classification!

There can be little doubt that the bone really is from Bielbecks. In the same case is the femur of a Lion, in a precisely similar state of preservation, labelled Bielbecks, and other remains from the same deposit, including those of Mammoth, Rhinoceros, Bison, Horse, and Deer.

These probably found their way to Hull many years ago when the Bielbecks deposit was examined by Phillips. His attention was called to it in 1829 by Mr. W. H. Dykes, of Hull,

who appears to have been the first to notice it. Phillips was at that time the curator of the Museum at York, so I suppose it is only natural that the most important specimens found at Bielbecks should have gone to York! To me it is surprising that, in the circumstances, any reached Hull at all! Probably Mr. Dykes (who took an interest in the foundation of the Hull Museum—then under the Literary and Philosophical Society) secured them. Mr. H. M. Platnauer, of the York Museum, has kindly supplied me with the following particulars of the Bielbecks specimens under his charge. Doubtless the bones of the Lion at York and Hull are both from one individual:—‘Of Bielbecks mammals we have: Wolf, Mammoth, Woolly Rhinoceros, Horse, Sheep,* Aurochs, Reindeer, Red Deer, and Lion.† Of the last we have: lower jaw (both rami), fragment of upper jaw, with carnassial and first molar, left radius and tibia, ulna, left femur, and two metacarpals.’

From the list of mammalian remains above it will be seen that the Bielbecks deposit is one of exceptional interest, and it is pleasing to notice that at the last meeting of the British Association a Committee was appointed to investigate it. The report of this committee will be awaited with interest.

The beds appear to have been first exposed by the tenant of the farm, who dug out large quantities of material to marl his sandy soil. They were described by Messrs. Harcourt, Salmond, and Phillips in the ‘Philosophical Magazine’ for 1829. Later, Mr. Harcourt gave the results of further investigation (six or seven hundred loads having been removed), and the third edition of Phillips’ ‘Geology of Yorkshire’ (1875) contains a good summary of the whole subject.

On Mill Hill, near Brough, is a somewhat similar deposit, which has yielded bones, etc., of *Elephas antiquus*, *E. primigenius* (Mammoth), *Bison priscus*, *Bos primigenius*, *Cervus elaphus* (Red Deer), and *Equus caballus* (Horse). The Mammoth tusk recently referred to in these pages‡ also came from this bed.§ Remains of the Lion have not been recorded here as yet. The only other record of Lion remains from the eastern part of the county appear to be from the famous Kirkdale Cavern near Kirby Moorside.

* It hardly seems probable that this species occurred in association with those cited—the point is worth looking up.

† To this list the Bear (*Ursus arctos*) is added by Mr. Blake.

‡ ‘The Naturalist,’ June 1903, p. 194.

§ For further details see Proc. Yorks. Geol. Soc., Vol. 13, pp. 221-231, and ‘Geological Rambles in East Yorkshire,’ pp. 192-197.

BOTANICAL SURVEY OF A PASTURE.

R. C. GAUT,
Garforth.

THE following investigations were carried out during the summer of 1903 in one of the fields (No. 122) of the Manor Farm, Garforth, situate about eight miles east of Leeds, and in the occupation of the Yorkshire Council for Agricultural Education.

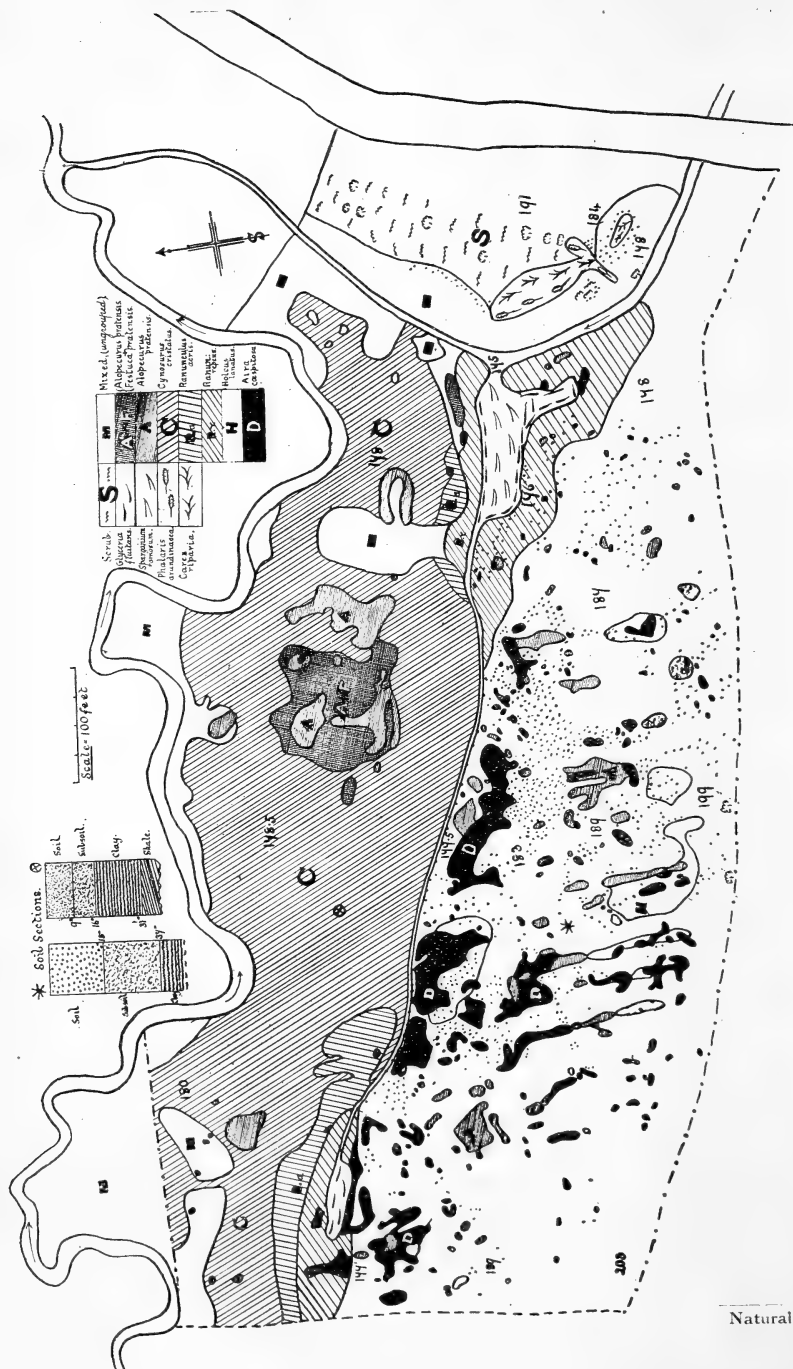
The field, which is a natural pasture of about eight acres in extent, offered such excellent facilities for a detailed survey of its herbage that an attempt has been made to reproduce the principal features on a plan and to offer some explanation as to the causes which have tended towards this distribution. The work, it must be remarked, was suggested from the results obtained in recent botanical surveys* which have aimed at a primary analysis of the vegetation of large areas, the importance of indicator plants as showing variation in soil being clearly demonstrated. It therefore seems advisable that a series of smaller studies should be undertaken in order to ascertain as far as possible the exact conditions indicated by social grasses.

Before dealing with the field itself it is essential that something should be said with regard to its surroundings and the district in which it is situated.

PHYSIOGRAPHY.—The surrounding country, which varies in height from 170 to 300 feet, forms the south-western limit of the Wharfe watershed; it has an average annual rainfall of about 30 inches. The streams have an east to west course, and all unite to form a confluent, 'the Cock Beck,' which empties into the Wharfe near Aberford; they are small and of low velocity, erosion being consequently reduced to a minimum.

GEOLOGICAL FEATURES.—The main geological features of this district, which constitutes the northern edge of the Yorkshire coalfield, are due in the south to the extensive outcrop of the Middle Coal Measures, consisting mainly of sandstones. These on the higher ground give rise by weathering to characteristic sandstone soils, but in areas of low elevation they are entirely covered by clays or soils of a peaty nature. On the north the Lower Coal Measures have but small exposure. They consist of extremely hard shales, dipping in a southerly direction under the sandstones; clays overlie them at the surface, which result in the production of soils of close tenacious character.

* W. G. Smith, Ph.D., 'Geographical Distribution of Vegetation in Yorkshire.'



Map of Field 122, Manor Farm, Garforth.

Beyond these and probably overlying them in the same direction, are rocks of Permian age.

SITUATION OF FIELD.—The field itself forms part of an east to west valley on the restricted outcrop of the Lower Coal Measures. It consists of three distinct portions:—(1) A flat region (C. on map) bounded on the north by one of the small streams alluded to, on the east by one of its tributaries, and on the south by a shallow ditch. (2) A slope with a northern exposure; this begins at the ditch and forms the southern part of the area, rising ultimately into a sandstone ridge in the cultivated fields beyond. These two are grass areas. (3) A bank (S. on map) on the east of the tributary with a western exposure and a 'Scrub flora.'

AGRICULTURAL FEATURES.—The low elevation of much of the field, the impossibility of draining, and its liability to prolonged inundation in winter and wet summers have prevented much improvement being carried out, consequently the herbage may be looked upon as natural, it not having been subject to alteration by grazing, drainage, or application of manures.

Draining has at some remote period been attempted by the ridge and furrow method on the slope, the furrows running in the direction of steepest slope, but apparently the result has been negative. The ditch dividing two of the parts alluded to has lost to a great extent its artificial character; it is about a foot deep and is seldom without water at the bottom. This is an important feature of the drainage, as an examination of the levels given will show. Where the ditch joins one of the main streams the level is 175 feet, and this may be taken to be the normal level of the two main streams. Between the ditch and the main stream there must therefore be a water-table at a depth varying from one foot to five feet below the surface. In time of flood this water-table rises above the surface of the soil and the lower portions of the field are converted into a pond.

EDAPHIC FEATURES.—In the present case climate and rainfall may be entirely neglected, because these must be the same over the whole field, except in regard to different exposures on the various slopes. The important factors are the physical nature of the soil and the drainage.

The soil and subsoil has been carefully studied throughout the field by means of borings. The implement used was of a very simple but, at the same time, efficient kind, being an augur of the type used by carpenters, but with a shaft prolonged to about four feet. A core of soil of this depth was

thus very quickly and easily removed, and the thickness of the various layers of soil measured. The results may be shown briefly thus, the differences of the surface soil being specially noted :—

(1) FLAT AREA.

(C. on Map.)	THICKNESS OF BED.		
Fine silt	9 in.
Subsoil	7 in.
Clay	15 in.
Shale	at	31 in.

The silt is exceedingly fine and is characteristic of the deposit from slow-flowing streams; it has probably all been deposited while this area was under water.

The clay is stiff, impervious, yellow in colour, but varying to steely blue. The extent of these two beds points to the greater width formerly of the now much reduced stream.

The subsoil is intermediate and calls for no comment.

Shale, which is reached at 31 in., is of a hard impervious nature.

(2) SLOPE (AND BANK).

	THICKNESS OF BED.		
Surface Soil	18 in.
Subsoil	19 in.
Clay	at	37 in.
Shale not reached.			

The surface soil is of a sandy, open nature, and, as indicated, of considerable depth.

The subsoil and clay are the same in character as those previously described.

The great distinction between this area and the one last described is the total absence of the fine-silt surface soil. This has either not been deposited (since the bank is never under water) or it has been denuded off and the coarser material from the sandstone ridge behind brought down on the clay.

VEGETATION FEATURES.—A first analysis reveals four main sub-divisions :—

(1) In the low-lying parts more or less in connection with the streams a small 'marsh flora.'

(2) Over the flat portion (C on map) short herbage, due chiefly to the abundance of Crested Dogstail (*Cynosurus cristatus*).

(3) The slope with a lengthened vegetation composed of taller growing grasses (the ditch dividing this area off sharply from the last), through which are dispersed pure grass islands

of Tussock (*Deschampsia cespitosa*), Foxtail (*Alopecurus pratensis*), and Yorkshire Fog (*Holcus lanatus*).

(4) The bank with a small 'scrub' flora.

The total flora includes 103 genera and 153 species.

For the present purpose the stream and its associated species may be neglected. The marsh flora is of that type common in the Coal Measure districts, but is only a remnant of an earlier one which had a more extensive range. Sufficient, however, remains, especially along the base of the scrub bank, to show that it was of the 'reed swamp' type, the marginal plants now alone being represented, e.g., *Carex riparia*, *Phalaris arundinacea*, *Sparganium ramosum*, *Alisma plantago*, *Glyceria fluitans*, and *Ranunculus sceleratus*.

The *Cynosurus* area is the next to be considered, but in passing to this from the marsh, two zones, the limits of which are distinctly traceable, have to be crossed:—

(a) Surrounding the marsh a zone characterised by the presence of *Ranunculus repens* and absence of *R. acris* and *Cynosurus*.

(b) An imperfect zone of *Ranunculus acris*, *Cynosurus* being still absent.

Turning then to the main area alluded to the following species are the chief:—

Dominant	<i>Ranunculus acris</i> .	<i>Senecio Jacobæa</i> .
	<i>Cynosurus cristatus</i> .	<i>Cerastium triviale</i> .
	<i>Lolium perenne</i> .	<i>Conopodium denudatum</i> .
	<i>Festuca pratensis</i> (agg.).	<i>Plantago lanceolata</i> .
	<i>Festuca ovina</i> (agg.).	<i>Prunella vulgaris</i> .
	<i>Ranunculus repens</i> .	

The majority of references to the habitat of *Cynosurus* give dry pastures and soils, but the present investigations indicate that these limits are too narrow. That it is an important constituent of the herbage growing under dry conditions there can be no doubt, but it is evident that it also flourishes under others which are nearly of an opposing kind, forming as it does the greater part of the vegetation in this area. That the conditions here are never dry except under very exceptional circumstances is apparent from the facts that the land is flat, of low elevation, surrounded on three sides by water and with the water table not far below the surface, soil fine, and with a shallow and horizontal basement of impervious clay.

The following conclusions are hence arrived at:—

(1) That *Cynosurus* may be an important constituent of low-lying meadows, the maximum degree of wetness which it can

stand being just outside the driest conditions in which *R. repens* is the dominant form of *Ranunculus*.

(2) That the dryness or wetness of situation cannot be the ruling factor governing its distribution, these conditions being too much opposed to one another. The explanation must hence be sought for in some other direction.

(3) Now, *Cynosurus* is not an important constituent of fertile banks and fields, simply because the materials giving the soil the necessary physical and fertile characters are in that proportion, and drainage is so efficient that the conditions are satisfied which encourage the growth of what is called the 'finer' herbage, resulting in the exclusion of the 'poorer' kinds. In short, *Cynosurus* is a grass characteristic of poor soil. As an indicator plant in a botanical survey *Cynosurus* would thus only point to a poor soil, and could not be relied upon as giving any information as to dryness or wetness of the soil. In its mode of growth it is suited to form a close sward and forms pastures both on sandy alluvium (e.g., of the river Skell, near Ripon) and on heavy land (e.g., near Selby), while it is also an abundant grass in the limestone pastures of Craven. Like many other plants of poor soils its power of adaptation appears to be considerable, and in botanical survey this biological property will have to be reckoned with.

What then is the link connecting the dry bank, the dry field and the wet field as habitats of *Cynosurus*? Clearly it is in the main due to the absence of the luxuriant species, and the presence of these is chiefly determinable by soil constitution. Over our area the soil must then be described as 'poor,' the poorness being, however, largely due, not to excessive movement of water, as in the case of the dry bank, but to inefficient percolation of water owing to the low elevation of the land and to the impervious nature of the underlying strata.

The next area, that of the grass slope with northern exposure, differs from the *Cynosurus* region in being covered with taller grasses. The following are the chief species:—

DOMINANT AND SOCIAL.

Deschampsia (Aira) cæspitosa.

Holcus lanatus.

Alopecurus pratensis.

SCATTERED.

Poterium officinale.

Stachys Betonica.

Scabiosa succisa.

Centaurea nigra.

Scilla festalis as a fringe along the southern edge.

SUBDOMINANT AND SOCIAL.

Poa pratensis.

Poa trivialis.

Festuca pratensis.

Galium saxatile.

Lathyrus montanus.

Rumex Acetosa.

What are the differences existing on this side of the ditch which have brought about the enormously different herbage? Here *Cynosurus* is entirely excluded, and there is a wealth of different grasses which similarly do not appear, even in small quantity (*Alopecurus* excepted), in the *Cynosurus* area. Now, if the soil conditions here are totally different from those found in the part just considered, it is only reasonable to suppose that it is to the soil alone to which these differences can be attributed; such as has been explained is the case. The surface soil, which is that of a sandstone wash, is of good depth and open. It receives much of the drainage water from the higher land in the adjoining field, but as the basement clay follows almost uniformly the surface gradient (which is about 1 in 25), there is a considerable natural drainage until the neighbourhood of the ditch is approached where the surface becomes horizontal.

Now, Tussock forms a great proportion of the herbage on this side as a pure grass; it grows luxuriantly even where the slope is greatest, and on the ridges alluded to, where the conditions are merging toward the dry. It is not so abundant here, however, as where the slope runs itself out. Water, at first sight, is the governing factor, as the areas increase in size as the slope is descended, but if this is the case, this grass should also extend to the other side of the ditch where like conditions prevail; the ditch has not constituted an impassable barrier, for its shallowness and artificial origin have precluded this.

Water, then, as the governing factor, is excluded, and also every other factor, which exerts its characteristic effect on vegetation, is eliminated, but soil. It is clear that we have here and in the foregoing very marked examples of the direct influence which the soil has on the nature of the herbage which it supports, for differences in herbage have in all cases been found to agree with differences in soil.

With regard to the pure areas of *Holcus*, the same is apparently the case, as it invariably occurs, either surrounding the Tussock masses, or, with Tussock, dispersed through it. This would naturally be expected, as these two grasses when growing under suitable conditions are rather similar in habit, as evidenced by their disputing the same places. Tussock, however, occurs in tufted and solid masses, therefore *Holcus*, the lesser, must surround it.

With Foxtail, however, although in the main the foregoing applies, the case is somewhat different. At first sight, and what

strikes an observer in the field, are the few and prominent islands of this grass in the *Cynosurus* area; its presence here seems inexplicable, as it is growing under conditions which seem to be much wetter than those in which it is usually recorded, or in which it can exist. [Numerous borings were made here in order to detect any local variation in soil, but none was found. The only difference apparent was the decidedly more 'humic' nature of the first two inches of soil, but this must be accounted for in the large amount of decaying material annually yielded by the aerial parts of Foxtail.] Observation has not extended long enough, but the probability is that its area is increasing, as its habit is similar but more luxuriant than that of *Cynosurus*, and owing to the land being subject to less inundation than formerly. Its presence and increase would also induce the increase of its associate, Meadow Fescue, which is found in parts to be intimately mixed with it. (In course of time it seems possible, conditions remaining the same, that an entire change in the character of the herbage on this area may take place resulting in the ultimate extermination of *Cynosurus*). On the other side of the ditch, the Foxtail is chiefly among the 'general vegetation' and only in cases does it come in direct contact with either Yorkshire Fog or Tussock.

THE SCRUB.—This is the only remaining part to be dealt with, but there is nothing to be gained by going into detail. It is of the 'Lowland Oak' type; the following is part of its constituent flora:—

<i>Quercus.</i>	<i>Galium saxatile.</i>
<i>Rubus</i> sp.	<i>Galium cruciata.</i>
<i>Rosa</i> sp.	<i>Holcus lanatus.</i>
<i>Lonicera.</i>	<i>Holcus mollis.</i>
<i>Fraxinus.</i>	<i>Deschampsia flexuosa.</i>
<i>Acer pseudoplatanus.</i>	<i>Deschampsia cæspitosa.</i>
<i>Lathyrus pratensis.</i>	<i>Stachys Betonica.</i>
<i>Lathyrus montanus.</i>	<i>Scilla festalis.</i>

The principal interest lies in comparing the species recorded here with those given as comprising the characteristic vegetation of the 'slope with northern exposure.' Most of them are common to the two areas, and some (*Lathyrus montanus*, *Stachys Betonica*, and *Scilla festalis*) are good indicator plants of woods with a light canopy. This evidently admits of only one explanation, viz., that the slope in former times was likewise characterised by an Oak wood and flora, remnants of which still survive. That these plants have remained after the removal of the trees is an evidence of their adaptation to changed conditions and

again illustrates the importance of this biological property as a factor which must be taken into account in plant distribution. One factor which compensates to a great extent for the removal of shade is the direction of slope (northward, 1 in 25) which means a reduction in the angle of incidence of the sun's rays.

From a review of the various features of the soil and vegetation described, it is possible to arrive at some conclusions as to the conditions which must have existed and the changes which have gradually come about and resulted in the present characters of the field.

The higher ground was formerly occupied by an Oak wood, but as cultivation was extended in the neighbourhood, the trees and shrubs were removed from the slope, those only being left on the bank, which, as shown by levels, is too steep for the employment of agricultural implements.

The low-lying ground was occupied by a slow-flowing stream which, owing to silting up in conjunction with local disturbances connected with the drainage of the district, assumed first the character of a marsh, and, later, conditions became sufficiently dry for the grasses (*Cynosurus*) to obtain a foothold.

It is probable that, as this drying up continues, *Cynosurus* may itself be replaced by other grasses, a supposition which receives considerable support from the evidence afforded in the flourishing conditions and apparent progress of Foxtail and Meadow Fescue.

FUNGI.

Coprophilous Fungi at Helmsley.—At the Helmsley Fungus Foray in September last I collected samples of sheep and deer droppings, and have since kept them for observation under glass. These produced upwards of a dozen species, of which the following four are additions to the list published in 'The Naturalist,' November 1903:—*Coprinus Gibbsii* Mass. & Crossl. This appeared in considerable quantity on the sheep dung, also on the deer dung. Some specimens considerably exceeded the dimensions given in 'The Naturalist,' January 1902, measuring from one to two mm. in diameter of pileus. In all other respects they agreed with the diagnosis. On the sheep dung were also found *Sordaria neglecta* Hans., *Saccobolus neglectus* Boud., and *Ascophanus argenteus* Boud.—THOS. GIBBS, Sheffield.

ECONOMIC FUNGI.

PART II.*

J. H. HOLLAND, F.L.S.,

The Museum, Kew.

SYSTEMATIC ARRANGEMENT.

Hymenomycetes	Agaricaceæ	<i>Agaricus fossulatus</i> Cke.
		<i>Amanita mappa</i> Fr.
		<i>Amanita rubescens</i> Fr.
		<i>Armillaria mellea</i> Vahl.
		<i>Cantharellus cibarius</i> Fr.
		<i>Clitopilus Prunulus</i> Scop.
		<i>Coprinus atramentarius</i> Fr.
		<i>Coprinus comatus</i> Fr.
		<i>Cortinarius castaneus</i> Fr.
		<i>Cortinarius cinnamomeus</i> Fr.
		<i>Cortinarius Emodensis</i> Berk.
		<i>Cortinarius violaceus</i> Fr.
		<i>Lactarius deliciosus</i> Fr.
		<i>Lactarius theiogalus</i> Fr.
		<i>Lactarius torminosus</i> Fr.
		<i>Lentinus cyathus</i> Berk. & Br.
		<i>Lepiota subocreatus</i> Cke.
		<i>Lepiota procera</i> Scop.
		<i>Marasmius oreades</i> Fr.
Gasteromycetes	Clavariaceæ	<i>Marasmius scorodonius</i> Fr.
		<i>Tricholoma gambosum</i> Fr.
		<i>Tricholoma personatum</i> Fr.
	Polyporaceæ	<i>Sparassis crispa</i> Fr.
		<i>Fomes igniarius</i> Fr.
		<i>Polyporus anthelminticus</i> Berk.
		<i>Polyporus corylinus</i> Fr.
		<i>Polyporus hispidus</i> Fr.
		<i>Polyporus officinalis</i> Fr.
		<i>Polyporus tuberaster</i> Fr.
	Tremellaceæ	<i>Hirneola rufa</i> Fr.
		<i>Clathrus cibarius</i> Fisch.
	Phalloidaceæ	<i>Lysurus Mokusii</i> Fr.
		<i>Bovista nigrescens</i> Pers.
		<i>Bovista plumbea</i> Pers.
	Lycoperdaceæ	<i>Geaster hygrometricus</i> Pers.
		<i>Lycoperdon Bovista</i> Linn.
		<i>Podaxon carcinomalis</i> Fr.
		<i>Polysaccum crassipes</i> DC.
	Uredinaceæ	<i>Gymnosporangium juniperinum</i> Fr.

* Part I. appeared in 'The Naturalist' for February 1903.

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SYSTEMATIC ARRANGEMENT—continued.

Pyrenomycetes ...	Perisporiaceæ ...	<i>Eurotium oryzae</i> Ahlburg.
Ascomycetes ...	Helvellaceæ ...	<i>Verpa digitaliformis</i> Pers.
	Tuberaceæ ...	<i>Terfezia Leonis</i> Tul.
Saccharomycetes	Saccharomycetaceæ ...	<i>Saccharomyces Cerevisiæ</i> Meyen.
		<i>Bacillus Beyerinckii</i> Trev.
		<i>Bacillus icteroides</i> Sanarelli.
		<i>Bacterium aceti</i> (Lanzi.).
		<i>Bacterium fragi</i> Eicholz.
Schizomycetes ...	Bacteriaceæ ...	<i>Clostridium butyricum</i> Prazm.
		<i>Clostridium Pasteurianum</i> (Winograd.).
		<i>Micrococcus vaccinae</i> Cohn.
		<i>Micrococcus xanthogenicus</i> Trev.
		<i>Streptococcus phosphoreus</i> Trev.
Hyphomycetes ...	Mucedinaceæ ...	<i>Penicillium glaucum</i> Link.

Agaricus fossulatus (Cooke). Cabul Hills. Edible. Dried and sold in the markets.

Amanita rubescens (Fr.). Europe and North America. In woods. Belongs to the same group as the 'Fly Agaric' (*Amanita muscaria*). Is largely used for making 'ketchup.'

Armillaria mellea (Vahl.) Hallimasche. Europe, America, Asia, and Australia. On the ground and trunks of trees. Is one of the commonest of all edible fungi in the markets of Vienna; but is considered of little, or no, value in England.

Bacillus icteroides (Sanarelli). Bacillus of yellow fever. Sanarelli's labours have not ceased with his careful study of the *Bacillus icteroides*, but have been carried into the important field of serum-therapy. By careful manipulation he has succeeded in immunising the horse and ox by large doses of the bacillus injected into a vein, so as to prevent the intense local reaction. He has found that the serum of these animals has the power to protect guinea pigs from lethal doses of the bacillus. He hopes that the serum will also be efficacious in the treatment of yellow fever in the human being ('Pathogenic Bacteria,' Dr. McFarland, 1898, p. 408).

Bacillus* (= *B. Beyerinckii* Trev.) *radicicola* var. *liquefaciens Beyerink or ***Rhizobium leguminosarum*** (Frank). Nitrogen gathering bacteria. Bacterium in root-nodules of leguminous plants for the assimilation of free nitrogen.

Bacterium aceti (Lanzi.). Acetic acid ferment.

- Bacterium fragi*** (Eicholz.). Gives to various media in which it may be cultivated (potato excepted) a flavour of strawberries. The discoverer, M. Eicholz, a Parisian chemist, hopes for some practical result of his investigations (Pharm. Jour., 22nd August 1903, p. 297; 'Daily Telegraph,' 7th August 1903).
- Bovista nigrescens*** (Pers.). Europe and Asia. In meadows and woods. Edible when young.
- Bovista plumbea*** (Pers.). Europe, North America, Siberia, and Turkestan. On the ground. Edible when young.
- Cantharellus cibarius*** (Fr.). The French 'Chantarelle.' Europe, North America, Brazil, and Australia. In woods. Edible. Dried in strings for winter use in parts of France.
- Clathrus cibarius*** (Fisch.). Lattice Fungus. New Zealand, Tasmania, and West Australia. In woods. Is eaten in most countries where it is found. The 'Thunder Dirt' of the New Zealanders; first described as a species of *Ileodictyon*.
- Clitopilus Prunulus*** (Scop.) Europe and North America. In woods. Said to be excellent, either stewed or pickled.
- Clostridium butyricum*** (Prazm.). Butyric acid ferment.
- Clostridium Pasteurianum*** (Winograd.). Bacterium in soil for the assimilation of free nitrogen.
- Coprinus atramentarius*** (Fr.). Europe and North America. On the ground. Used with others for making 'ketchup.' Sometimes used for making ink.
- Coprinus comatus*** (Fr.). Europe and North America. On the ground; on dung. Edible.
- Cortinarius castaneus*** (Fr.). Europe and North America. On the ground. Edible.
- Cortinarius cinnamomeus*** (Fr.). Europe and North America. In woods. Edible.
- Cortinarius Emodensis*** (Berk.). Northern India and Himalayas. In forests. Edible.
- Cortinarius violaceus*** (Fr.) Europe and North America. In woods. Edible.
- Eurotium oryzae*** (Ahlburg). Japan and Germany. On Rice (*Oryza sativa*). Cultivated on bran, in Japan, for the production of '*Taka diastase*.'
- Fomes ignarius*** (Fr.). False Tinder Fungus. Europe (Britain, Bohemia,) Siberia, North America, Brazil, Ceylon, and Australia. Parasitic on trunks of *Alnus*, *Prunus*, *Salix*, etc. Used as flower-pots for creeping plants of a dry character by scraping out the centre and fixing to the wall.

Geaster hygrometricus (Pers.). Europe, Asia, Africa, America, and Australia. On the ground. Used as a drug in China.

Gymnosporangium juniperinum (Fr.). Europe and North America. On the branches of *Juniperus communis* and *J. nanus*; on the leaves and fruit of *Amelanchier canadensis*, *Cratægus oxyacantha*, *Pyrus malus*, etc. In Pennsylvania forms gall-like tubercles studded with scars from which the fungus has fallen. These excrescences, called 'cedar apples,' are considered a remedy for 'worms' (anthelmintic).

Hirneola rufa (Fr.). Japan, Ceylon, South America, and Australia. On decaying wood. Edible.

Lactarius deliciosus (Fr.). Europe and North America. In pine woods, etc. An Agaric highly esteemed and sold in the markets of most places in Europe.

Lactarius torminosus (Fr.). Europe, Siberia, and North America. In woods.

Lactarius theiogalus (Fr.). Europe and North America. In woods.

Lactarius theiogalus, *L. torminosus*, together with *Amanita muscaria* and *A. mappa*, all poisonous species, have been employed as an antidote to the venom of serpents.

The sap extracted directly from the fungi, or a decoction obtained by 24 hours' maceration in water, given in small doses, has rendered animals immune to the venom of serpents, the period of immunity lasting from 15 days to a month.

Lentinus cyathus (Berk. & Br.). Australia and China. On the ground. Formerly referred to *Pachyma Cocos* (Fr.)—*Tuberaceæ*—which is now understood to be only the *sclerotium*.

The *sclerotium* is eaten, and is called '*Pe-foo-ling*' by the Chinese.

Lepiota subocreatus (Cooke). China. Is dried in the air on strings passed through a hole in the short stem, and sent, it is believed, from China to Singapore.

Lepiota procera (Scop.). Europe, North America, Ceylon, India, South Africa, and Australia. On the ground. Edible (one of the best) and very ornamental.

Lycoperdon Bovista (Linn.). Europe, North America, Asia, and Java. In pastures. The common Puff-ball. Edible when young and white. Used, when fully developed, as a styptic, and for stupefying bees.

Lysurus Mokusin (Fr.). China. On the ground. Eaten in China.

Marasmius oreades (Fr.). Europe, Siberia, North America, Africa, and Borneo. 'Fairy-ring Mushroom.' Edible. Said to be the best.

Marasmius scorodonius (Fr.). Europe, Siberia, and North America. On fallen twigs and heather. Eaten in Germany, Austria, etc. Possesses an odour of garlic and is used in sauces, in fact, is an excellent condiment.

Micrococcus vaccinæ (Cohn.). The active element of vaccine lymph in vaccination, by which a certain degree of immunity is assured from smallpox.

This *Micrococcus* occurs in fresh lymph, and in the pustules of true smallpox.

Micrococcus xanthogenicus (Trev.). Is said to have been discovered in Brazil in persons suffering from yellow fever. Vaccination with gelatine cultures has caused a mild type of yellow fever. Rabbits and Guinea Pigs so inoculated were proof against the fatal type of the disease (Groom's 'Synopsis of Bacteria and Yeast Fungi,' 1884, p. 95).

Penicillium glaucum (Link.). Over all the world. On leaves, stems, and fruit. The Vinegar Plant. Mycelium employed in country districts for the manufacture of vinegar from saccharine liquor. Is cultivated in cheeses; this fungus being the cause of the green veins in the famous Roquefort, Gorgonzola, Camembert, and Stilton cheeses, to which is due the special flavour for which these cheeses are noted.

Podaxon carcinomalis (Fr.). Cape of Good Hope, California, New Mexico, and Queensland. In ant-hills. Black spores used occasionally for curing carcinomatous ulcers. (Also known as *Lycoperdon carcinomale*.)

Polyporus anthelminticus (Berk.). Burmah and India. At the root of bamboos. Employed as an anthelmintic.

Polyporus corylinus (Viv.). Italy. Cultivated on charred stumps of the Cobnut Tree (*Corylus Avellana*) in Rome. Edible, not highly recommended.

Polyporus hispidus (Fr.). Europe and America. On tree trunks. The Fungus Gamboge; yields a yellow dye similar to ordinary gamboge.

Polyporus officinalis (Fr.). Europe, Siberia, and British North America. On Larch, etc. Used by the Indians as a purgative. Formerly '*officinal*' in the English Pharmacopœia.

Polyporus tuberaster (Fr.). Germany and Italy, in mountainous districts, and cultivated in Naples on a sort of Tufa stone (*Pietra funghaia*). Edible, but not highly recommended.

Polysaccum crassipes (DC.). Southern Europe and Australia. Yields a yellow dye.

Saccharomyces Cerevisiæ (Meyen.). Cultivated on saccharine fluids. Common yeast. Largely used for brewing and making bread. Known generally for the latter purpose as 'barm.' Dried German yeast is imported largely from Germany and Holland.

Sparassis crispa (Fr.). Europe and Carolina. In Pine forests, etc. Edible. Eaten in Austria.

Streptococcus phosphoreus (Trev.). 'Cultivated in a suitable medium in one to two litre flasks, sufficient light is produced to see the time by a watch, or to read a thermometer at a distance of one or two metres. On a clear night the light from such a culture is visible up to a distance of over 60 paces. It has been suggested that similar cultures might be employed in the place of lamps in places where things of an inflammable nature are kept—powder magazines, etc.' (Pharm. Jour., 30th May 1903, p. 755).

Terfezia Leonis (Tul.). Italy, France, Sardinia, North Africa, Asia Minor, Syria, and Britain. Underground. Edible. 'In Rome an underground fungus belonging to the Tuberales, has long been known only in close proximity to "*Helianthemum guttatum*." R. Pirotta and A. Albin find that the peculiar appendages to the root of this plant are infested with a mycorrhizal mycelium, which is in organic connection with the receptacles of "*Terfezia*'" (Royal Microsc. Jour., June 1901, p. 311).

Tricholoma gambosum (Fr.). Britain, France, and Italy. On the ground, in pastures, etc. St. George's Mushroom. Highly esteemed as an article of food; and when dried has been known to realise as much as 15s. per lb.

Tricholoma personatum (Fr.). Europe. In woods, on the ground. Edible.

Verpa digitaliformis (Pers.). Nearly all parts of the Continent of Europe and Britain, and North America. On the ground. Sold in the Italian markets. Edible, but not very desirable.

I have to thank Mr. Massee for further assistance, and Major Winn Sampson for numerous references to the microscopic forms.

THE HENBANE.

REV. E. A. WOODRUFFE PEACOCK, F.L.S.,

Cadney, Brigg.

MR. W. C. HEY's note on *Hyoscyamus niger* surprises me not a little. Its infrequency in East Yorkshire is in my experience of Lincolnshire most unusual. I have between fifty and sixty localities for this species, on all kinds of rock-outcrop soils for North and South Lincolnshire. Every division of the county is represented, except 18th on the extreme south-east, which is still badly worked for want of local help. It is a species which is here this season, and then gone for half a dozen, or even longer in some cases. In my experience it is not in the least peculiar that not a single seedling appeared as the result of the West Ayton plants blooming. Though I have watched a score of times I have never known seedlings follow on such occasions. *Hyoscyamus* is truly biennial, and as truly sporadic—i.e., its seeds have to rest in the soil or elsewhere an uncertain time before they will grow. After I had settled here in 1891 I received a collection of plants and notes from Mrs. E. Brown, the widow of the late vicar. There was a Cadney specimen among the dried plants, and also notes of its occurrence. But I saw nothing of this species in my daily observation of the flora of the Sandy Glacial Gravel, on which the village of Cadney stands, till 1894. It could hardly have escaped observation so long if it were present. Two people in the village took a personal interest in botany and natural history, and to them I applied. The late Mrs. Hannah Abbey, born in 1804, at once replied:—‘Live here long enough and you'll see 'em often enough, sir. The seeds can't grow till they've been buried some years and are suddenly unhappened.’ Standing by her cottage door she pointed across the road with her stick to a shaded hedge bank and said:—‘On yon bank, before Smith's drainage was put down, there was a little spring called “the Jinny Pot Well,” and the Henbane has grown there any time these sixty years; but it was never there when you wanted it for toothache—unless you'd got the seeds when it was there! If you live here long enough, an' they cut that old hedge back, you'll see it yourself with your own eyes. What's more an' all, there is another plant like it, but not the same. It may come year after year for years, and then go for years, and if you stay here you'll see it as well. I calls it ‘Joe Maunders’; and it's a large yellow flower with a red centre o' hairs.’ This unexpected piece of information was more than I could explain. *Datura*,

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Verbascum Thapsus!—the description would not fit either. Years passed, the old lady was gathered to her fathers, and finally one winter the hedge was 'cut back.' Five plants of the Henbane appeared next season, as prophesied, and finally three plants I could not recognise. They were carefully watched over and guarded. The Henbane left no successors, but 'Joe Maunders,' as if to prove the whole truth of the old woman's observation, has left a handsome progeny annually with us ever since. The species on flowering turned out to be *Verbascum Blattaria*. Both species seeded most freely, and I have specimens from these very plants in my type collection of seeds. From the tens of thousands of ripe seeds, a four-foot high and very wide bushy plant of *Hyoscyamus* produced, not to name the four small plants of the species, not a single seedling has ever been detected. I have no doubt, however, if the bank were 'forked over' a plentiful crop would be the result at this distance of time. My experience of *Hyoscyamus* is very much like Mr. Hey's. Some very dry earth and mortar from the foundations of a waggon shed at Bottesford, pulled down in 1866, after standing at least eighty years, produced a plentiful crop of plants when mixed with the stiff clay of the Lower Lias. It is here a piece of wisdom imparted to me by my second Cadney friend, the late Mr. H. Trevor, comes in. When I asked him to show me where *Hyoscyamus* grew, he said 'It's no use going an' looking for it, an' I tell ye why. The whorrums (worms) take the seed a stickling to their bodies under ground, and you've to dig 'em up before this plant grows, for they must lig under ground so long'—he did not say how long—'before it'll grow at all.' He suggested I should look out in the gravel pit 'where the top soil is often moved'; and it was on the road from the pit spoken of where I first met with the Henbane at Cadney. In that season, 1894, I found it in a number of places. *Datura* is another sporadic species which appeared at Bottesford along with Henbane; neither species has failed to show in the garden spoken of at longer or shorter intervals since that time. Seeds of all these species have now been lying in my type collection for ten years. If anyone would like to experiment with them, and would publish the results in 'The Naturalist,' I shall be happy to supply them with all I can spare. As a rule seeds rapidly lose their fertility in the dry air of my study, in the collection tubes, which are only closed with cotton wool. I have tested by experiment many of the grasses and other small seeds to find them growing rapidly less and less fertile by lapse of time. I have, however, never tested any species of the *Solanaceæ* or *Scrophulariaceæ*.

FIELD NOTES.

MAMMALS.

Otters Breeding in North Lincolnshire.—A family of Otters have for the last two seasons made their home and erected a large nest upon the exposed, covered-in, broad landing-stage of a boathouse at the side of a private North Lincolnshire lake, and therefore open to inspection. Last year they succeeded in rearing a family of three cubs successfully, their presence being respected and guarded by the owner. It offers an unexceptionally good opportunity of watching their breeding habits, of which a great dearth of data exists. As an angler my sympathies are scarcely with them, as they wreak such wanton damage upon the fish, not merely for food but purely for the love of killing, after a battue many fish being found dead from one bite and otherwise untouched. Last year a large Otter was brought to me, the same having been shot at dusk upon a farm through which runs a stream which takes its origin in the neighbourhood of this lake. This splendid English specimen I have now stuffed, its length from the snout to tail in its freshly dead state being 46 inches, its weight 22 pounds, both practically maximum dimensions. It is possible that it may be one of this interesting colony.—OTTO. G. S. L. OVERBECK, Grimsby.

BIRDS.

Tree Creeper in North Lancashire.—Referring to Mr. S. L. Petty's note in the March 'Naturalist' (p. 92) I find that in my copy of Mr. W. B. Kendall's MS. 'Birds of Salhouse' he remarks, 'Rare. Last seen in village in 1876.' This, of course, applies to the village of Salhouse, near Barrow-in-Furness, and not to North Lancashire generally. I may also state that Mr. Kendall was Mr. Durnford's informant referred to as W. B. K. Mr. Petty is under a misapprehension on this point.—H. GAYTHORPE, Barrow-in-Furness.

FUNGI.

Schizophyllum commune in East Yorkshire.—In my notes on this species ('The Naturalist,' 1904, p. 89) one record was unfortunately omitted, viz.:—On decaying trunks, Scarborough, Geo. Massee, 'The Naturalist,' July 1881.—W. N. CHEESMAN, Selby.

Mushrooms Growing in a Smithy.—Forty years ago a meadow near Barrow Head was noted for Mushrooms, and in a blacksmith's shop in Fisher Place, which was built on a portion of this meadow, Mushrooms have grown during the last twenty years. In 1901 the largest one of a dozen lifted up the brick pavement. On 11th September 1902 one appeared growing between the joints of the brick paving. It was then a 'button' less than one inch in diameter. On the 18th it was $7\frac{1}{4}$ inches in diameter. On 18th July 1903 one appeared between the joint of a flag and the brick wall. On the 24th July it measured six inches in diameter, and on the 27th ten inches, with a stem two inches thick. In the meantime four others had sprung up at the foot of the forge, and about two feet from the hearth—a warm place. On Monday, the 20th, two of these were three inches in diameter and the other two two inches. On the 27th these had increased in size to six inches and five inches respectively, and were still growing. They are edible Mushrooms. The blacksmith's assistant has eaten them and says he wants more.—HARPER GAYTHORPE, Barrow-in-Furness.

[This is possibly the Horse Mushroom (*Agaricus arvensis*) which sometimes grows under abnormal conditions and is edible.—EDS.]

REVIEWS AND BOOK NOTICES.

List of Yorkshire Lepidoptera, by G. T. Porritt, F.L.S., F.E.S. Second Edition. 1904. 270 pages, cloth. A. Brown & Sons, 5, Farringdon Avenue, E.C. 6s. 6d. (including the 'Supplement to the List of Yorkshire Lepidoptera,' Trans. Y.N.U., Part 30. 2s. 6d. net. A. Brown & Sons).

Time flies quickly with lepidopterists, who live so much in the future, but I would scarcely have believed it twenty years since Mr. Porritt published his 'List of Yorkshire Lepidoptera,' of which we now have a second edition, including a supplement, with fifty-three additional species, and a long list of insects that have become or are becoming melanic.

Yorkshire must have been well collected over prior to the appearance of the first list, or a much greater number of additions would have been made. It is a very large county, with much uncultivated land within its area, and in parts, such as the Cleveland Hills, there must be many a mile where the foot of an entomologist has never yet trod. Of the fifty-three species new to Yorkshire in the list, only eleven are macro-lepidoptera, and of these Mr. Porritt regards seven as being only 'casuals.' *Laphygma exigua* is included in these seven, though no fewer than eight specimens were taken one night near Keighley. It is an insect we know little about, but I expect it will be turned

up in the same place this autumn. He does not include *Heliothis peltigera* among 'casuals,' though only a single specimen was taken at Kilnsea Beacon, at the 'extreme seaward edge of the sandhills at Spurn.' The writer's opinion is that *Heliothis peltigera* in this country is always a 'casual.' One insect new to science and one or two new to Britain are included among the 'micros.' The species new to science, *Gelechia tetragonella*, was taken by the late John Sang some twenty years ago, on a salt marsh at the mouth of the river Tees. Mr. Porritt, on the strength of the place of capture being 'near Redcar,' claims this as a Yorkshire insect. I always understood Mr. Sang that he had taken this on the Durham side of the river, and I know of no salt marsh on the Yorkshire side likely to produce anything entomologically. Be this as it may, Mr. Porritt did quite right to include it according to the published account, but I think he is mistaken for all that. By the way, there is a printer's error in connection with this insect that should be noted. On page 252 the year '1895' is evidently a misprint for 1885.

The list of insects in connection with melanic changes is a startling one from its length, and it is certainly not complete. In suggesting that 'smoke' is 'a probable cause,' Mr. Porritt does not go beyond facts, and he hopes that the Committee of the Royal Society, now examining this phenomenon, will provide a satisfactory solution. May it be so.

Mr. Porritt proposes to exclude from his former list ten species that he is now convinced should never have been included. Several of these are given with great doubt in the original list, and are probably properly excluded now. With all this the list is now swollen to 1,386 species, an enormous number for one county.

By the way he does not include *Plusia moneta*, which certainly was taken by Mrs. Holmes, of Seven Oaks, at Robin Hood's Bay in 1901, and which I would expect has occurred in many places since.

To conclude, the list is carefully prepared, well printed, and will be a valuable help to those who are studying the distribution of our insects.

JOHN E. ROBSON.

'The Year Book of the Hull Trades and Labour Council' for 1904 is a very different publication from the generality of works of this character, and Mr. F. W. Booth, the Editor, is to be congratulated on the nature of the articles he has secured for the benefit of the working classes, for whom the year book is

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provided. The first paper is 'A Plea for Popular Gardening,' by Mr. H. B. Witty, Superintendent of the Hull Parks. Mr. J. Fraser Robinson contributes 'Nature, the Child and the Teacher,' in which he deplores the fact that most people at leisure 'prefer to sit astride a bicycle, perch on the top of a tramcar, or watch a piece of inflated leather being kicked about a field,' rather than listen to the solicitations of 'Nature,



Exterior View of the Hull Museum.

the old Nurse.' There is an article on 'The Hull Museum and Education,' by the Curator, which is well illustrated. One of the blocks from this is reproduced herewith.

YORKSHIRE GEOLOGY.

'The Proceedings of the Yorkshire Geological and Polytechnic Society' (why not drop the 'Polytechnic'?) for 1903 are just to hand. The principal place is accorded to Mr. P. F. Kendall's 'Glacier Lakes of Cleveland,' with supplementary notes,* which are illustrated by a magnificent series of maps and sections. Mr. J. H. Howarth follows with 'Notes on Boulder Markings on Mr. Kendall's Map,' which may be taken as a very valuable

* See 'The Naturalist,' January 1903, pp. 14-16.

summary of the 17 years' work of the Boulder Committee of the Yorkshire Naturalists' Union, of which Committee Mr. Howarth is the able Secretary. We hope to see the Committee's work somewhat similarly dealt with in the pages of 'The Naturalist' in the near future. Mr. W. Simpson describes three deep borings in the Millstone Grits of Halifax; Mr. G. W. Lamplugh records the presence of land-shells in the Infra-glacial chalk rubble at Sewerby; and Mr. J. R. Dakyns gives some Glacial Notes on part of Wharfedale, written in 1878. Other contributions are by Messrs. E. D. Wellburn, A. Harker, B. N. Peach and W. L. Carter. That of the last named is a most useful 'Classified Index of the Proceedings' from 1839 to 1902. With regard to Mr. Wellburn's contribution, there should have been figures of the new species he describes. Without being in anyway ungrateful for the excellence of the papers, etc., in the volume, we should like to see a greater proportion of papers the cream of which had not gone by having previously been published elsewhere.



BRITISH LIZARDS AND SNAKES.

We have lately received an interesting volume by Dr. Gerald R. Leighton, on 'The Life-History of British Lizards and their Local Distribution in the British Isles,' published in Edinburgh by George A. Morton. It is a cloth-bound book of 214 pages, with 28 half-tone blocks and three diagrams.

The author is an enthusiast in the study of British reptiles, as not only this volume but his previous one on the 'Life-History of British Serpents' (but surely 'Snakes' would be better) show, and the two volumes abound in interesting facts and observations, original and collected, with respect to these animals. Nevertheless, these works are disappointing in more than one way. The information given is capable of effective rearrangement and severe condensation, the style is diffuse, and a certain amount of unnecessary elementary introduction is given, and with all the wealth of information given it is not always easy to get at the salient points.

With regard to the information on distribution we may take the North of England. The notes for Yorkshire are all from three individuals only, and the author seems unaware that there is such a work as the Vertebrate Fauna of Yorkshire, or that the volumes of 'The Naturalist' abound in notes and information on the subject. These remarks apply also to the other Northern English Counties, and the Berwickshire and Tyneside Transactions do not seem to have been searched, let alone many local lists for various districts.

The illustrations of the book on Lizards can scarcely be considered as approaching in merit those of the one on Serpents, and the half-tone process scarcely seems capable of giving one a graphic idea of the specific aspect of a reptile as it does in the case of mammals. One illustration is a most interesting local one of a male Adder, caught at Grosmont in May 1900, and we are grateful for the fact that in this case and several others the particulars of locality and date are given in the Serpent volume, a pleasing feature conspicuous by its total neglect in the volume on Lizards.

It seems a pity that the author did not aim at producing a handy work descriptive of all the British Reptiles and Amphibians in one volume, as

was done by Bell and Cooke, in their excellent little works. This could have easily been done without losing any of the interesting facts and details which make each of these volumes a pleasant one to read.

The true British Lizards are but three in number, but two others occur in the Channel Islands, which are included in the scheme of vice-counties used by British workers, and so the volume includes descriptions of all five.

The general topics treated of in the Lizard volume are the specific characters given by Mr. Boulenger with some important diagnostic figures—the fragility of the tail theoretically discussed—the colour-variation of Lizards, and their limbs.

One interesting local item is the presence of the true Sand Lizard on the Southport and probably also the Cheshire sandhills, a remarkable feature in its distribution.

R.

The thirteenth 'Annual Report of the Society for the Protection of Birds' has been received, and contains a year's record of good work. As an appendix is the address delivered by the Rev. Canon Rawnsley at the Bird and Arbor Day Festival, held at Warcop, Westmorland, in December.

The Proceedings of the Liverpool Naturalists' Field Club for 1903 have just been published. They are principally occupied by an interesting 'Botanical Resumé (including a description of the Field Meetings of 1903)' by Miss E. M. Wood. A photograph of the late J. J. Fitzpatrick forms the frontispiece.

We have received the 'Report of the Select Committee on Ventilation, appointed by the House of Commons (Blue Book, 1903).' 1s. (London: Hickson, Ward & Co.) In this the 'Plenum' system is condemned, and the natural or 'automatic' (Boyle's) system recommended. Sir Michael Foster, F.R.S., a past president of the Yorkshire Naturalists' Union, is the Chairman of the Committee.

'One and All Gardening for 1904' (92, Long Acre, London, W.C.) will certainly do much to further popularise the healthy occupation of gardening. It contains 200 pages, is well illustrated, and is sold for *twopence*! Amongst the many articles the following may be mentioned:—'Board School Children's Flowers,' 'Floral Evolution,' 'Some Plants of Shakespeare,' 'A Common "Murder" Plant,' etc. The volume reflects the greatest credit upon the Editor, Mr. E. Owen Greening.

A four-paged circular, entitled 'The Thirty-third Annual Report of the Sheffield Naturalists' Club for 1903' is to hand. It contains a list of officers and members, a balance sheet, and the report of the Council, in which the work of the various sections of the Club during the year is reviewed. There is a substantial balance in hand, part of which we should like to see spent, say, in publishing the list of the 'Carboniferous limestone fossil fauna occurring at Castleton,' or the results of the other work the Club is doing.

The 'Twenty-seventh Annual Report and Proceedings of the Lancashire and Cheshire Entomological Society, 1903,' have just reached us. Besides lists of officers, etc., the Proceedings contain the texts of one or two papers read at the society's meetings. One of these, presumably by Mr. W. Webster, entitled 'Some Notes on Entomological Antiquities and Folk-Lore of Insects and other Creeping Things,' is of a most valuable character and more than worth the price of the volume (one shilling). An entertaining address by the same writer, 'The Entomologist before the Law,' is also printed. A reprint of a paper by Mr. F. N. Pierce from 'The Entomologist' is bound up with this publication.

The Birmingham and Midland Institute Scientific Society has just published the 'Records of Meteorological Observations taken at the Observatory, Edgbaston, during 1903.' They have been prepared by Mr. A. Cresswell, and are sold at 2s.

Mr. Harold Wager has sent us reprints of two of his recent papers, viz., 'The Nucleolus and Nuclear Division in the Root-apex of *Phaseolus*,' and 'The Cell Structure of the *Cyanophyceæ*. Preliminary Paper.'

'Controverses Transformistes,' Par Alfred Giard, 180 pages, 23 figures, 7 francs, C. Naud, 3, Rue Racine, Paris. The author of this work has taken part in all the recent controversies relative to the Laws of Evolution, which have been the subject for instruction which the City of Paris has confided to him at the Sorbonne. The volume contains certain contributions from his pen on this interesting subject, which have appeared in various memoirs, and they will be much appreciated in their present form. The essays will be read with interest and profit, not only by biologists, but by all those who interest themselves in the progress of scientific ideas during the last quarter of a century.

NORTHERN NEWS.

Two Badgers have recently been killed near Bedale, where they seem to have increased in numbers in recent years.

Mr. N. Treveling informs us that he captured two specimens of *Apocheima pedaria* in Meanwood Wood, Leeds, on 10th March.

A fine 'fossil tree' is reported as recently found at Sowerby Bridge. It is 17 feet in length and varies from nine to twelve inches in thickness.

The Rev. Francis C. R. Jourdain contributes some 'Rough Notes on Derbyshire Ornithology, 1902-3,' to the March 'Zoologist.'

Prof. E. B. Poulton's presidential address to the Entomological Society, entitled 'What is a Species?' is printed in the Society's Transactions just issued.

Mr. A. Smith, Grimsby, informs us that during the stormy weather of February a Puffin was washed aboard one of the Grimsby trawlers when near the Humber.

The late Mr. Comber's collection of diatoms has been presented to the British Museum by his widow. Mr. W. H. Pearson's collection of hepatics has been purchased by the same institution.

Amongst the names appearing in the list of Justices of the Peace for Halifax we are pleased to notice that of Mr. J. H. Howarth, F.G.S., Hon. Treasurer of the Yorkshire Naturalists' Union.

At a recent meeting of the Manchester Entomological Society Mr. B. H. Crabtree exhibited varieties of *Odontopera bidentata*, ranging from very pale forms to black, from South Manchester district.

In the March 'Entomologist' Mr. J. Arkle gives particulars of the lepidoptera captured during 'A Fortnight in Northumberland' in August last. He includes a list of the principal specimens in the collection of the late Edward Pearson, of Wallington.

In a recent issue of the 'Transactions of the Manchester Geological Society' Mr. Henry Hall has a note on 'Abraded Coal, a New Theory of the Formation of Coal.' From an observation made at a colliery near Prescott, the author states 'it is clear that coal may be abraded by water, and reformed again into a solid seam of pure coal in the course of half a dozen years.'

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PUBLICATIONS RECEIVED.

Knowledge and Scientific News, April.
Le Mois Scientifique, March.
Bird Notes and News, April.
La Feuille des Jeunes Naturalistes, April.
New Phytologist, March.
Entomologist, April.
Journal of Conchology, April.
Irish Naturalist, April.
Botanical Exchange Club, Report for 1902, Vol. 2.
Nature Study, April.
Nature Notes, April.
Naturæ Novitates, Januar, Nos. 1 and 2; Februar, No. 3.
Halifax Naturalist, April.
Revue Bryologique, No. 2.
The Rise and Progress of the Standard Oil Company. [Harper & Bros., Pub. 1903.
Nautilus, April and Index.
Science Bulletin of the University of Kansas, Vol. II., Nos. 1 to 9.
Memoirs and Proceedings of the Manchester Literary and Philosophical Society, 1903-4, Vol. 48, Part II.
The Annals of Scottish Natural History, April 1904.
Catalogue of British Coleoptera, by T. Hudson Beare, B.Sc., F.R.S.E., F.E.S., and H. St. J. K. Donisthorpe, F.Z.S., F.E.S.
The Zoologist, April 1904.
The Flora of the Parish of Halifax, by W. B. Crump, M.A., and Charles Crossland, F.L.S., 1904.

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NOTES AND COMMENTS.

'THE HALIFAX NATURALIST.'

As a result of the enthusiasm of a band of hard-working naturalists such as is possessed by few places of its size, Halifax has produced its valuable little bi-monthly, 'The Halifax Naturalist,' with regularity during the past eight years. The April 'Extra, Concluding, Double Number' brings to a close a short but useful career of still another local publication, though its loss will be more keenly felt than that of several which have preceded it. That it has done good there can be no question. It has been the means of the very excellent 'Flora of Halifax' appearing for the benefit of our botanists. In its pages are also to be found many useful notes and records, principally dealing with the district covered by the journal. We can only hope that, for the benefit of future workers, sets are preserved in our principal libraries.

CURIOUS PREHISTORIC RELICS.

Reference was made last year to the excellent guide to the Stone Age antiquities which had been issued by the British Museum (see 'The Naturalist,' April 1903, pp. 98-99). Mr. C. H. Read has just published a sequel to this, dealing with the antiquities of the Bronze Age. It refers to a most interesting period in the history of these islands, and a selection of Continental relics is also figured and described. The 'Bronze



Fig. A.—Chalk Drum, Folkton.

Age' cannot be clearly defined as that period during which the metal bronze was used exclusively for the manufacture of implements, etc. Stone was unquestionably used well into the bronze period, just as the use of bronze was continued after the introduction of iron. Amongst the many interesting objects figured, some unique chalk drums, from a barrow on Folkton Wolds, East Yorkshire, are probably the most puzzling. These are

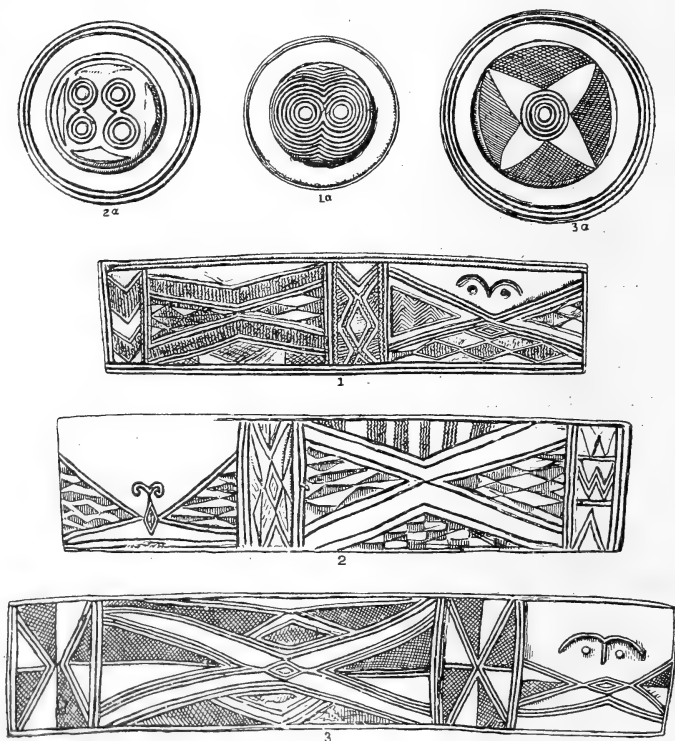
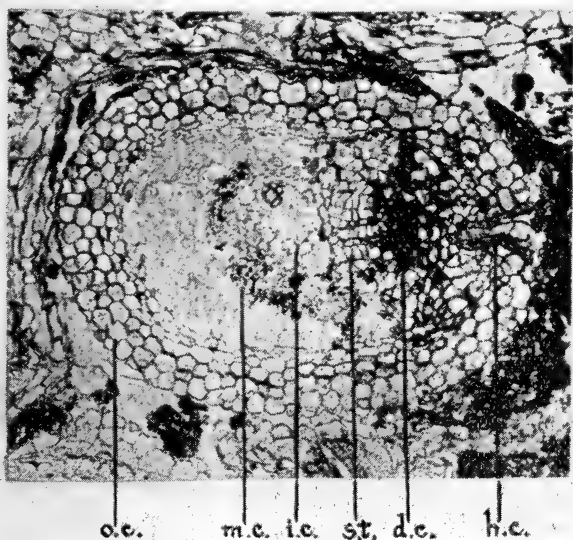


Fig. B.—Ornamentation of Chalk Drums, Folkton.

figured herewith, by the permission of the Trustees of the British Museum. Figure A shows the largest of the three, two-thirds natural size, the details of the ornamentation of the top and sides of which are shown on Figs. 3 and 3a. Figs. 1 and 2 represent details of the smaller drums. The designs are cut in the hard chalk, and are thought to show a connection with the 'Egean' culture of the Mediterranean. Everything points to the transmission of that influence to the British Islands by way of Spain.

FOSSIL FUNGI.

On account of their fragile nature it is hardly to be expected that fungi are likely to occur in any number in a fossil condition. Dr. F. E. Weiss, however, has just described a section of a coal-measure plant which appears to show signs of fungus growth. The section in question is of a Stigmarian rootlet in the Cash collection, Owens College Museum, and was obtained from the Halifax Hard Bed. This, Dr. Weiss considers, shows evidence of having been attacked by a fungus of the *Urophlyctis* type, a suggestion supported by the fact that Magnus is the

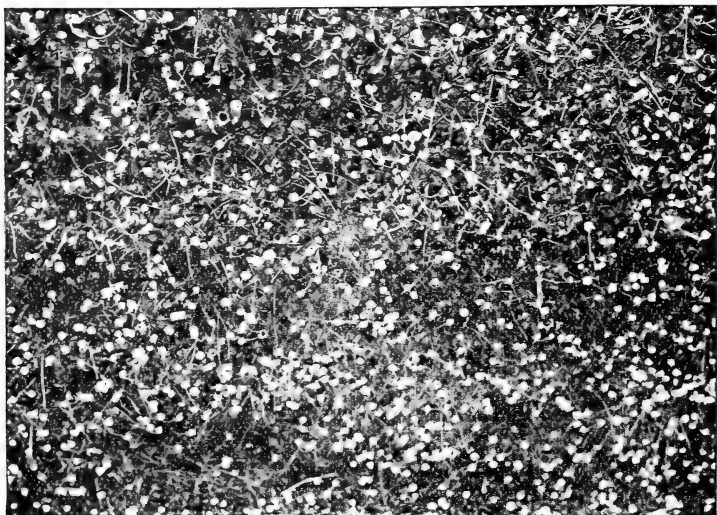


Fossil Fungi.

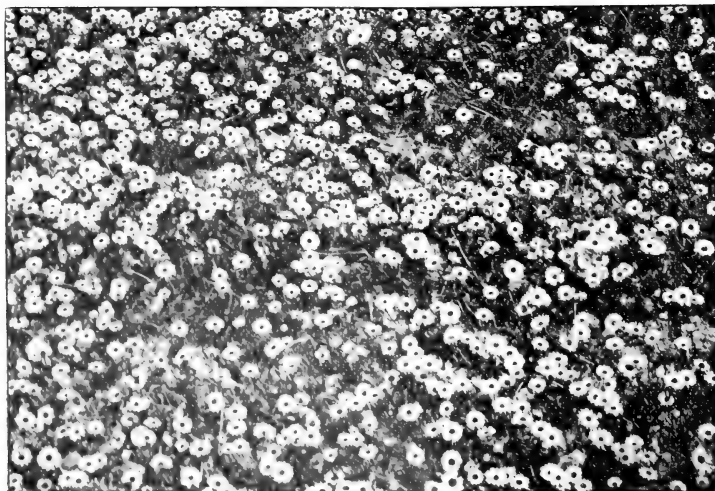
authority for this genus in Coal-measure times. Dr. Weiss's paper appears in the March 'New Phytologist,' to the Editor of which we are indebted for the loan of the accompanying 'general view of section of Stigmarian rootlet; *o.c.* = outer cortex, *m.c.* = remains of middle cortex, *i.c.* = inner cortex enclosing the dark wood elements at the top and a large space in the position of the defective phloem, *st.* = secondary tissue of callus-like nature cutting off to the outside the dead and disorganised cells (*d.c.*), *h.c.* = large hypertrophied cells penetrating the outer cortex and opening to the exterior.'

PHOTOGRAPHY AND NATURAL HISTORY.

Reference has previously been made in these columns to the great service photography now is to the study of natural history



Daisies Asleep
(Photographed before Sunrise).



Daisies Awake
(Photographed after Sunrise).

in all its branches, and the more frequent appearance of the camera on field excursions is a welcome sign. The brothers Kearton have certainly accomplished much to popularise natural history photography, and their latest work, 'Wild Nature's Ways,' like those previously issued, is largely devoted to the birds. It also illustrates, however, numerous other channels in which the photographer may direct his energies. The frontispiece, 'Large White Butterflies covered with Dewdrops,' is superb. Similarly, 'Daisies Asleep' and 'Daisies Awake,' photographed before and after sunrise respectively, give representations of the relative appearances of a carpet of this common



Angle Moth on Dead Beech Leaves.

but beautiful flower in a manner much more marked than might be supposed. Another illustration, showing the Angle Moth on dead Beech leaves is exceptionally fine, and except to the practised eye the moth will not be readily distinguished from its surroundings. We are indebted to the publishers, Messrs. Cassell & Co., for the illustrations.

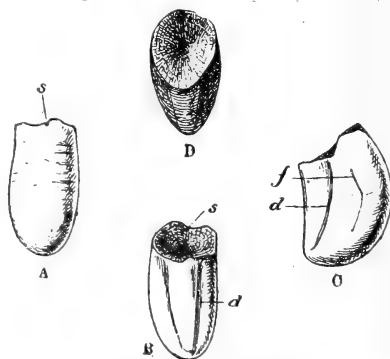
THE UPPER CHALK OF ENGLAND.

Northern geologists will be glad to learn that Mr. Jukes-Brown's memoir dealing with the Upper Chalk of England has just been issued by the Geological Survey. It is a massive volume of over 500 pages. So far as Yorkshire is concerned the proportion devoted to it is small, and, whilst most useful as a summary of the literature on the subject, cannot be regarded as thoroughly reliable. Too much attention seems to have been paid to the work of previous writers, and too little to actual work in the field; in fact, judging from some of the statements, it seems fairly obvious that the writer had not been acquainted

with the district at all. Barrois, who, over a quarter of a century ago, accomplished so much during his brief examination of the chalk of these islands, was particularly unfortunate in his interpretation of the Yorkshire beds. Some of his errors are perpetuated in the new memoir. Yorkshire geologists will hardly agree with the suggested thickness of 402 feet for the *Marsupites* zone (p. 285), or with the statement that the Hunmanby fault 'carries the chalk on one side below the alluvium of the Vale of Pickering,' and they would like also to see specimens of *Marsupites* from below the beds near Danes' Dyke (p. 284), and the example of *Offaster pillula* (p. 289). Of particular interest and value is the list of the fossils of the Upper Chalk of Yorkshire, which appears to be the first fairly complete list published. Economically, the volume contains much information of value; and there is a good 'general list of fossils' and a Bibliography; but the Index is miserably poor, and the illustrations, particularly of the fossils, are a disgrace to a Government publication of the twentieth century.

A DEFORMED BELEMNITE.

During his examination of the Yorkshire Chalk Dr. Rowe obtained a curious Belemnite from the zone of *Micraster coranguinum* on Flamborough Head, the like of which he had not previously seen, 'even in Yorkshire.' In an appendix to Dr. Rowe's paper Mr. G. C. Crick describes this specimen. It is almost perfect, and is shown, natural size, in



A Deformed Belemnite.

the accompanying illustration, kindly lent by the Geologists' Association. Mr. Crick states: 'The affinities of the fossil are quite clear, but whether it should be regarded as an abnormal form of a known species, or a new species, or even a new genus,

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is not quite as evident.' A little later he adds: 'Although the guard does not exhibit any definite injury, such as is usually seen in deformed specimens, there appears to be every reason to believe that the fossil is simply an abnormal form of *Actinocamax granulatus* Whatever produced the abnormality of the fossil affected it from quite an early stage in its existence.' The idea that the fossil is simply a hump-backed Cuttlefish of a known species seems far more reasonable than that it represents a new genus or new species.

EARLY EARTHENWARE.

Recently several interesting 'finds,' including examples of British and Anglo-Saxon earthenware, have been made in the vicinity of Grantham. One of the best of these is the vessel figured herewith, which was found at Denton, near Grantham, whilst excavating for ironstone. As will be seen from the



illustration, the vessel is covered with minute incisions made in the clay whilst soft, and is provided with a handle—a rare feature. It is of British date and is six inches high, and its outside diameter is $4\frac{1}{2}$ inches. Somewhat similar vessels have been found in Bronze-Age barrows on the Yorkshire Wolds. We are indebted to the Editor of that excellent paper the 'Connoisseur' for the loan of the block.

ROUT OF THE USURPERS.

KENNETH McLEAN,

Harrogate.

DURING the spring of 1903 in many rookeries the nests were so scattered by the tearing west winds that the birds found it was not a matter of rearranging (as usual) but of rebuilding. In so doing many chose more sheltered positions, and, to obtain such, some wandered a considerable distance from their fellows. One nest, built about 200 yards from a large rookery, I noticed several times during the winter and early this spring. On the 17th of March I was in the neighbourhood of this nest and heard a terrible jangle of caws which I at once interpreted into sounds of strife. I managed unobserved to get within a short distance of the disputants, and soon learnt the cause of the discordant altercation. Evidently a pair of Carrion Crows (*Corone corone*) in passing had come across this solitary nest, and, thinking it suitable for their domestic duties, had decided to appropriate it, and were making some little alterations when the original owners came upon the scene, and immediately attacked the usurpers. The Crows held their position manfully (or crowfully), but, unfortunately for them, the noise of battle reached the ears of the Rooks busy in the neighbouring rookery, and they swept down in such overwhelming numbers that the Crows were compelled to beat a hasty retreat. The Rooks pursued them for some distance and then returned.

The pair, however, to which the nest had originally belonged were not allowed to take possession, for the whole colony immediately set to work and pulled it to pieces. Stick by stick it was carried away to the adjacent rookery. Probably those which took the sticks considered they had a right to them in payment for their assistance in the fight; or perhaps they addressed the owners of this outside nest somewhat in this fashion, 'We are not going to let you build here, where you will be pestered with Crows and other dangerous characters. You must come within the precincts of the rookery, where you will be protected, and where you will have to do your part in promoting the common weal of the *Trypanocorax frugilegus*.'

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COMMITTEE OF SUGGESTIONS FOR RESEARCH.

THE Yorkshire Naturalists' Union, with an organised system of Sections and Committees of Research, a valuable series of monographs issued as transactions, and a monthly journal of good repute, has in this way pledged itself to carry on research work on the Natural History of Yorkshire. In the early days of the Union, research—or the revealing of new facts—was probably somewhat easier than it is now, when new species and new records are harder to obtain. Yet with increased difficulties there are increased facilities—better primary education, better tools to work with, and better means for visiting all parts of the county. The earlier work was done largely by individual members; the present and future work would be greatly facilitated by the co-operation of members in definite investigations. The growth of special committees with special objects is distinct evidence of this need. The formation of a committee for research signifies the closer linking of a limited number of members having a common object—to carry the subject they take up further forward than they found it. These committees have enhanced the reputation, not only of the Union as a whole, but also that of the parent sections, and they have encouraged individual members to achieve results which might never have passed the bud-stage without the stimulus of co-operation. Yet the committee system has its weak places. It tends to draft off many active naturalists into companies, each with its own plan of campaign. Without a general staff of control there is the risk of loss of touch in the operations, and useful investigations in the natural history of the county are neglected. These weaknesses exist in scientific work as a whole. The British Association has as one of its functions the correlating of scientific workers not only in Britain, but in other parts of the world. The original conception of the Yorkshire Naturalists' Union was to bring together the numerous naturalists' societies in Yorkshire not only socially but also as workers in natural history. The co-operation of different branches of science is specially necessary when the object is to learn as much as possible about a district. This is not difficult in the case of any one local naturalists' society whose members meet together frequently. In the case of the Yorkshire Naturalists' Union it is a difficulty. The Committee of Suggestions for Research is a proposed solution. On first thoughts the Executive, elected from the sections and committees, may appear to satisfy the

requirements of a controlling staff. There is, however, the argument that the officers of the executive have too much to do, and to have a dual control of some other official concerned in the research questions would introduce an element which might lead to discord. The formation of this latest committee is all the more necessary because important questions relating to the natural history of the county do not fall conveniently within the sphere of any single committee. Another reason is that there are many members in the societies of the Union who feel that they have not the leisure and opportunity to do work on the lines of the Research Committees, but who might be able to take up some of the suggestions for research in other directions.

At this early stage it is impossible to define accurately the scope of the Committee of Suggestions. The chief object is to promote co-operation of members in dealing with questions involving knowledge of several branches of science. The following suggestions may serve as illustrations of work which the committee could carry out, and may also evoke other suggestions for research :—

I.—The investigation of the peat deposits of Yorkshire is a subject which merits attention from the Yorkshire Naturalists' Union. The county possesses in its extensive upland and lowland peat mosses a magnificent opportunity for investigations on peat. It may almost be said that every naturalist in Yorkshire lives near enough a peat deposit to permit of frequent visits to it. At the same time no single society is in a position to investigate all the peat deposits of the county. The task need not be a difficult one if carried out on an organised plan, and a monograph on the subject could be made a publication second to none of those already issued by the Yorkshire Naturalists' Union. It would also be unique in Britain. The new committee would be the agent for the collection of the necessary observations. The workers would be drawn from every society and every section in the Union. A provisional plan of work is given below :—

(a) Records of the occurrence of peat deposits including (1) exact position and extent of the part observed ; (2) its altitude above sea level (both these could be determined at once by reference to the Ordnance Survey maps, and a complete map could be prepared by the committee ; (3) depth of peat and nature of the soil or deposit beneath the peat ; (4) composition of the peat. The determination of the composition would

probably be beyond the skill of the majority of observers, but the difficulty could be met by the Committee of Suggestions if the following collections and observations were made.

(b) Specimens of peat. In any cutting various layers of peat (bog-moss peat, heather peat, cotton grass peat, etc.) would probably be exposed. Specimens of each layer recognised, with a sod of the surface vegetation, and a piece of the moor pan or other deposit beneath the peat, could be collected by anyone, and forwarded to the committee. For the present specimens might be sent to Messrs. P. F. Kendall or W. G. Smith at the Yorkshire College. The committee would then endeavour to find some individual or individuals to examine specimens and prepare reports.

(c) Collection of named mature seeds or fruits of British plants. This is necessary for the identification of any seeds found in the peat (or other recent deposits). Mr. Clement Reid, while doing work of this kind, finds that complete collections do not exist. Certainly there is no full collection belonging to the Yorkshire Naturalists' Union. The Agricultural Department of the Yorkshire College have at the Manor Farm, Garforth, a small collection which for the present might be used as a nucleus. If any member of the Yorkshire Naturalists' Union who may have a collection of seeds, or who will make this collection, could forward duplicates to Dr. W. G. Smith at the Yorkshire College, this collection could be increased and would be accessible to members of the Union. If the occasion arises that the Yorkshire Naturalists' Union (or its societies) desires a collection of its own, arrangements could be made to provide this from the above collection.

(d) Timbers found in peat, with records where found. Various collections of these already exist, but a report including details of these and any new finds is required.

(e) Animal remains found in peat or other recent deposits, with records where found. Arrangements could be made to ensure the identification and preservation of these. This applies not only to Vertebrate remains, but also to several groups of Invertebrates. For example, there are several good collections of wings and other parts of Coleoptera which have been found in peat in Britain, and are as yet only imperfectly identified; this branch therefore offers an opening for original work.

(f) The geological members could obtain, or assist in obtaining, information regarding the deposits underlying the peat, and in other ways clear up questions on the origin of peat.

(g) Archæologists could share in the work, by finding or identifying implements or other remains found in or under the peat.

(h) Members interested in Meteorology could greatly assist by obtaining statistics of rainfall, etc., on the peat. These observations are also urgently required by the Botanical Survey Committee for its work generally.)

(i) The Botanical Survey Committee is interested in the vegetation which occurs on different forms and different depths of peat.

(k) The Committees interested in Microscopy could deal with fungi and organisms inhabiting peat.

It will thus be seen that any naturalist could take part in this investigation, even though it only amounted to contributing specimens of peat from one place. Every Section and Committee of the Union has a share in the work. The Committee of Suggestions is the body to bring the observations together, and to promote the necessary investigations.

Other suggestions for research have been received. At present these are chiefly geological and botanical, but a brief summary may evoke suggestions in other directions.

II.—Entomologists and botanists might combine in observing the insects which effect the pollination of flowers. Some work of this kind has already been done in Yorkshire.

III.—The same sections might also combine in an investigation on the distribution of insects in relation to definite types of vegetation.

IV.—The Committee on Invertebrate Zoology might claim the assistance of botanists in identifying plants used as food, e.g., by snails and slugs.

V.—Photographers have many opportunities of co-operating with the scientific sections. The British Association have committees for the collection of (a) geological, (b) botanical, (c) anthropological photographs. The Committee on Geological Photographs have already set the example in the Union, and their delegate (Mr. Bingley) on the Committee of Suggestions has lodged a proposal which would make these photographs more widely available than they are at present. The photographing of fungi has also been taken up. In other branches of botany there is also great scope for the use of the camera.

By means of an organised scheme of registration, photographs of scientific interest could be recorded and made available to members of the Yorkshire Naturalists' Union. The illustration

of papers and lectures would benefit greatly from a scheme of this kind.

VI.—The food of birds and the influence of birds and animals in distributing seeds, etc., are other subjects which would require co-operation of naturalists.

In conclusion, it will be seen that the Committee of Suggestions will fill an existing gap in the work of the Yorkshire Naturalists' Union by arranging combined action of naturalists to carry out investigations which may from time to time be suggested. It is a feature of scientific discovery of the present time that many new investigations cannot be conducted within the limits of any definite science, but come between two or more of the recognised sciences. So with investigations on the natural history of a county, there are greater possibilities if workers in various fields will combine. Not only will this advance the prestige of the Yorkshire Naturalists' Union as a body of workers, but it will materially aid the other objects of the Union, the bringing together of its members from all parts of the county as brother-naturalists.

Communications for the Committee of Suggestions should be sent to the Convener, Dr. W. G. Smith, Yorkshire College, Leeds.

P. F. K.
W. G. S.
T. W. W.

MOLLUSCS.

***Paludestrina jenkinsi* in Holderness.**—*Paludestrina jenkinsi* is now abundant in a tributary of the Burstwick drain between Hedon and Burstwick, three miles from its previously recorded East Yorkshire localities near the Humber. It was not found in this or the main drain in 1902, when a careful search was made for it throughout the district. The possible route from its nearest station on the Humber bank requires a journey through half a mile of salt water and two miles of brackish water against the current, and it has not yet been found at intermediate points. Only one carinated specimen occurred among several hundreds examined, and that an empty shell on a caddis case. Many from this locality have flat-topped whorls, and these also show much variation in the relative size of the body whorl and in the shape of the mouth.—T. PETCH, 16th April 1904.

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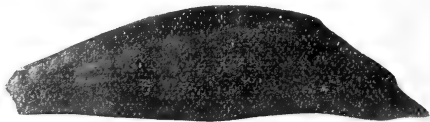
REMAINS OF THE BEAR IN EAST YORKSHIRE.

THOMAS SHEPPARD, F.G.S.,

Hull.

AMONGST a valuable collection of specimens from the Bridlington 'Crag' acquired by the late Judge Bedwell and presented to the Hull Museum on his death, is the tooth of a bear, in very good condition. It bore a label in Judge Bedwell's writing to the effect that this was the identical tooth described by Tindall, from whom it was purchased.

In the 'Geological Magazine,' Vol. I., 1864, page 142, Mr. Edward Tindall contributes a note on 'The Present State of the Bridlington Crag,' in which he refers to a Bear's tooth obtained from the 'Crag' which he sent to the editor of that magazine for inspection. The editor makes the following comment—'The tooth referred to is a canine tooth of the Brown Bear (*Ursus arctos*), hitherto only obtained from the Fens of Cambridgeshire.'



Tooth of Bear (*Ursus arctos*).

Mr. G. W. Lamplugh, F.G.S., informs me that upon the reprint of this note in his possession Mr. Tindall has added in MS.—'I have found teeth of Sharks, vertebræ of Fish, etc., etc., in the above-mentioned deposit.' The record appears to have been largely overlooked in later publications, and in the geological memoir relating to the district no mention seems to be made of it, though in the list of specimens from the Bridlington 'Crag' given in Clement Reid's 'Geology of Holderness,' *Ursus*, sp. in Judge Bedwell's collection,' is quoted and in all probability refers to the tooth in question. There appears to have been some doubt as to the genuineness of this record, which may account for its importance having been largely overlooked.

The gallery in the museum in which Judge Bedwell's collection was placed was some years ago inundated by water. This resulted in the bear's tooth cracking and finally splitting in two. A recent examination of the specimen has revealed the fact that the cavity in the tooth is filled with the characteristic green

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sand of the Bridlington 'Crag'—placing the genuineness of the specimen beyond doubt.

Its appearance amongst a collection of marine shells is somewhat unexpected, but Mr. Lamplugh has drawn attention to the fact that amongst the material which he examined some years ago exposed in front of the promenade at Bridlington, were some streaks of peat-like material containing traces of land fauna and flora. A reduced photograph of the tooth is reproduced herewith. The original is $3\frac{1}{2}$ inches long and 1 inch wide at its widest part. The top of it is fractured, which appears to be of recent date.

ARCHÆOLOGY.

Neolithic Remains in Durham.—Referring to Mr. C. T. Trechmann's note in 'The Naturalist' for March (pp. 77-78), the following is a list of further neolithic remains found in Durham:—

1. A fine hammer-head, of polished granite, taken from the Wear at Sunderland.
2. An axe- or hammer-head, of Greenstone, perforated to admit a handle, found at Millfield, near Sunderland.
3. A stone hammer-head, found at Coves Houses, near Wolsingham.
4. Three hammer-heads found at Egglestone-in-Teesdale.
5. A hammer-head, found at Redworth.
6. An axe of Greenstone, measuring $5\frac{3}{4}$ inches long, found at Sherburn.
7. An axe-head of basalt, dug out of a peat moss at Cowshill in Wear-dale.
8. An axe-head, found near Stanhope.

The first-named is in the possession of the Society of Antiquaries, of Newcastle; the remainder were formerly in the possession of Canon Greenwell and others. Solitary arrow-heads made of flint have been found in Morden Carrs, near Sedgfield, and also in the neighbourhood of Castle Eden, Ebchester, Edmundbyers, Lanchester, Medomsley, Satley, Stanhope, etc. Large numbers of arrow-heads have from time to time been found in the fields at Hamsterley in the Wear Valley, and in Weardale, leading one to believe that there had been a manufactory of such weapons somewhere in those districts. The most extensive discoveries of this kind have been made at Newton Kelton, about four miles from Darlington, where hundreds of flint implements, arrow-heads, scrapers, knives, and flakes have been found in association with beads made of amber and jet, and of white and deep blue glass.—J. W. FAWCETT, Satley, Darlington.

THE HAWTHORN (*CRATÆGUS OXYACANTHA*).

P. Q. KEEGAN, LL.D.,

Patterdale, Westmorland.

ASSOCIATED indissolubly with the merry month of May, this shrub or small tree has gathered round it a cluster of human associations with which the severe scientist does not scorn to sympathise. The brilliant aspect of its countless blossoms, all in a robe of whitest grain and of exquisite symmetry of form burst into full expansion, catches the eye and arrests the regards of the most earthy clodhopper or the most demure of unsophisticated natives. The olfactory sense is regaled as well by the delicious odour, and a cheerfulness as of a living thing seems to beam expressively from amid the sombre canopy of leaves—all eminently fitted to evoke in the human onlooker a corresponding cheerfulness all its own. It may, therefore, be permissible to present a brief chemical and physiological account of this popular organism, commencing with the

STEM.—The wood is hard and heavy (specific gravity 0·76), white or slightly reddish, very homogeneous, but without regularly circular growth or clear distinction between alburnum and duramen, though sometimes marked with brown or reddish spots in the central parts. The medullary rays are mostly in two rows, the cells thereof being about $15\cdot4\ \mu$ (micromillimetres) high and $13\ \mu$ broad, their number in a millimetre of arc being about 14; the vessels are very fine, being only $40\ \mu$ wide, are isolated and very numerous, but decrease in number and size towards the autumn portion of the annual ring which ends in a narrow zone free therefrom, their walls have no tertiary thickening-layer; the fibres are very close-set, have stoutly thickened walls and are intermixed with very small parenchyma-cells. In the bark the parenchyma consists of large thin-walled cells mingled with small sieve-tubes filled with a thin watery liquid, whereas the fibres are collected in long isolated bundles disposed in zones alternating with the soft bast and copiously attended by cells containing large, clearly defined crystals of oxalate of calcium; the medullary rays (in two or three rows) pass unchanged from the wood into the bast, but there assume a curved contour; the superficial periderm formed in the first year of growth still persists up till about the thirteenth year,

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when a thicker suberous tissue of flat cells is developed, which, gradually becoming impermeable, leads on at an advanced age to the production of a brown-red scaly and furrowed rhytidome. The wood contains a little tannin and glucose, free phloroglucin, and copious starch in summer, but in winter the latter becomes reduced in quantity and appears confined exclusively to the pith, medullary rays, and medullary sheath, whereas it completely vanishes from the bark during the colder season. At the end of May a branch $1\frac{1}{4}$ inches diameter was examined; the dried bark contained 1.25 per cent. of a yellow wax with traces of fat, but no carotin or terpene resin, also 7.1 per cent. tannin, 2 phlobaphene (free phloroglucin occurs in the primary cortex, bast parenchyma, and medullary rays), 0.8 oxalate of calcium, and 10 ash which had 4.6 per cent. soluble salts, 2 silica, 51.4 lime, 1.7 magnesia, and 1.23 P_2O_5 ; the wood yielded 1 per cent. of ash which had 29.8 per cent. soluble salts, 32.8 lime, 8.5 magnesia, and 6 P_2O_5 . The thorns or spines which stud the smaller branches so obtrusively are not mere epidermal growths, but, supported by vascular bundles, are really aborted organs, due doubtless to the drainage and diversion away of food-material for the support of flower and fruit; according to Lothelie dry air and strong light accelerate their production, while humidity retards it and modifies their structure.

LEAVES.—The mesophyll is composed of two layers of palisade cells about three times as long as broad and studded with clear and sharply defined chlorophyll-granules, and also an irregular lacunar tissue with large intercellular spaces; the walls of the upper epidermal cells are straight, those of the lower are sinuous, and both are free from hairs; the stomata are very large but sparse, their number being only about 131 per square millimetre of surface. The habitual deep division of the lobes (especially in *C. monogyna*) is connected with a deficiency of nutritive material, which also ensures a very thin tissue non-absorbent of heat. At the end of July the dried leaf contains nearly 2 per cent. carotin and wax, with traces of resin, but little or no fatty matter, 3.5 tannin and rutin, over 12 proteid substances, very little sugar, a very large quantity of mucilage (formed mostly in the lower wall of the cells of the upper epidermis), very much starch and oxalate of calcium, and 6.9 ash which contains 19.7 per cent. soluble salts, 1.6 silica, 38.9 lime, 4.7 magnesia, 4.3 P_2O_5 , and 3.6 SO_3 ; there is very little iron or manganese (distinguished from the Cherry); in the autumn yellow and brown leaf the percentage of ash rises to

10 per cent. (with 6 silica, 40.4 lime, and 3.7 P_2O_5). This composition clearly indicates an early decay of the vital powers, and an excessive oxidation of the carbohydrates owing to the extraordinary stimulation of the respiratory processes concerned in the evolution of the flower and the maturation of the lavishly abundant fruit.

FLOWER AND FRUIT.—The inflorescence is disposed in the form of a corymbiferous cyme. The upper surface of the petal is studded with papillæ, and it is in these that the droplets of odoriferous oil are mainly localised, whereas the tannoid matters (rutin) preferably accumulate in the lower surface. The solar radiation of early May is not sufficiently strong to destroy the odoriferous products of deassimilation, but at the same time it is powerful enough to favour their elaboration. The odour belongs to the class 'aminoid,' but it is tempered somewhat and rendered redolent of ammonia by the decomposition of lecithin present in the flower and its stalk. In the red varieties of the flower tannin takes the place of rutin, and the essential oil is consumed. The cyme fully developed yields 5.8 per cent. of ash having 38 per cent. soluble salts, 21.5 lime, 4.1 magnesia, 8.9 P_2O_5 and 3.8 SO_3 . The fruit has been variously regarded as an achene, a pome (i.e., the mesocarp belongs to calyx and receptacle, and not to ovary), and finally a drupe. It matures about 15th September, and then consists of (1) an epicarp of tabular cells and a non-distinct hypoderm, (2) a flesh (mesocarp) of spheroidal and ellipsoidal cells, and (3) a nucleus (endocarp) made up of a layer of flattened sclerous cells, a layer of small ditto with enclosed crystals, and a layer of fibres. The seed-covering is thin and non-sclerified, the endosperm is relatively voluminous, and the cotyledons thick; both the latter contain aleurone and oil as reserve materials, but no starch. The pericarp contains an iron-blueing tannin, an ill-developed red pigment, much starch (none in Cherry, Plum, etc.), mucilage, and various sugars. The fruit (air-dried) yields about 2 per cent. of ash having 33 per cent. soluble salts, 19.4 lime, 5 magnesia, 10.5 P_2O_5 and 2.4 SO_3 . It would seem that the extreme stony hardness of the endocarp here is brought about at the expense of the starch and of the tannin, which latter in consequence is never fully converted into pigment.

SUMMARY.—The extreme fineness of the wood-vessels, as well as the paucity of stomata in the leaves indicate clearly a serious feebleness of the conducting and transpiring functions of those organs. Possibly, however, it may be this very

infirmity whence springs the perhaps most remarkable feature of the Hawthorn, viz., the extraordinary quantity of lime which it manages to absorb from the soil. It is never found growing naturally on a wet soil ; in fact, it flourishes most robustly on a dry gravelly loam—a bottom where what may be called its root-needs predominate and preside over as it were its very existence. Gravelly clays and loams, although they may be utterly free from carbonate of lime, are indispensable for the pushing forth and proper functioning of certain roots and root-lets. The remarkable feature is that, notwithstanding a comparative poverty of the soil in lime, the Hawthorn nevertheless manages to absorb into its tissues an enormous quantity of it. Thus, for instance, in October the buds are filled in nearly all parts with oxalate of calcium which persists and remains over the winter until the spring ; in the young leaves numerous small druses of the same salt appear and grow in size very rapidly, and are still present in the fallen leaves of autumn. So likewise with the young shoot wherein druses first appear in the pith, then in the primary cortex, and crystals in the bast, which continuously increase in the course of summer, and in winter reach nearly to the cambium. In general, the later growth of the vascular bundles of branch and stem is accompanied by a separation of oxalate of calcium, and this has a tendency to remain where it is originally formed and deposited. Dead dried twigs and weather-beaten scales of bark are found permeated with the same salt. In a section of Hawthorn stem-wood in my possession several large octohedral crystals of oxalate are seen scattered over the slide occupying large thin-walled special sacs in the vicinity of the vessels and medullary rays—a phenomenon quite unique in my experience. The physiological function of oxalate of calcium has been the bone of considerable contention. Some assume that it is a fixed reserve-substance destined to be utilised by the plant later on, e.g., for the supply of cellulose-material for the formation and thickening of the cell wall, etc. Others hold that it is formed in those cells in which mucilaginous substances of a chalky nature or pectin compounds are copiously accumulated, it being developed entirely or mostly within the ambit, as it were, of these bodies. Again, when the conditions of a very active transpiration are especially favourable, then is the time it has been asserted, that the oxalate depositing is most pronounced ; but this view has been combated. Altogether, in my opinion, the formation of the salt is due to an oxidation of

the carbohydrates, especially of those which are constituents of the vegetable mucilages, and I suspect also that the presence of a liberal amount of bicarbonate of lime in the tissues may be in some way prominently concerned with this especially active oxidation.

SOME YORKSHIRE COLEOPTERA. GEODEPHAGA.

J. W. CARTER, F.E.S.

DURING 1903 some interesting records of our local *Geodephaga* have been made which are embodied in the following notes, together with some observations on species previously recorded. It is always interesting to confirm the recorded work of older naturalists who have passed from amongst us, otherwise, when no specimen vouchers exist their work is often only accepted with a doubt, and each record spoken of as another of 'so and so's records.'

In 'A List of the Coleoptera of Yorkshire,'* by the Rev. W. C. Hey, some of the earliest and only records were made by 'S. Gibson' and most of his work was done on 'Midgley Moors,' in the vicinity of Halifax about 1828 and a few years onwards. It is very gratifying that all or nearly all of these records have been confirmed, if not from 'Midgley Moors' from moors of a similar nature, and not very far distant, viz., Rombalds and Harden Moors.

Mr. Gibson does not often give any idea of the comparative abundance or scarcity of the species recorded, but some of them we now know to occur in the greatest abundance on Rombalds and Harden Moors, and it would be of great interest if some of our Halifax entomologists would investigate the beetle fauna of these identical moors, as the botanists of that district have so ardently investigated the flora.

CARABUS NITENS L. Scarcely a season passes without this beautiful species being brought to me by persons who have been crossing the moor to Ilkley. They have been caught while crossing the footpath in the hot sunshine.

CARABUS GRANULATUS L. Evidently a rare species in this district, and the only specimen I have seen is one given me by Mr. W. West, F.L.S., and taken by him near Cullingworth, 3rd May 1885.

CARABUS MONILIS F. The same remarks apply to this species. The only one I have ever taken here is labelled 'Seven Arches, March 16th, 1890.' I have another, without date, taken at Wilsden by Mr. E. P. Butterfield; these are the only specimens I have seen from this district.

* Transactions of Y.N.U., Series D, Vol. III.

CARABUS ARVENSIS F. I have two examples from Baildon Moor, one taken April 1897, by Mr. F. Booth, and the other April 1898, by the late B. Illingworth. They are much brighter in colour than my Ingleborough specimen previously recorded.

CARABUS CATENULATUS Scop., **C. NEMORALIS** Mull., and **C. VIOLACEUS** L. are all of frequent occurrence. Some seasons *C. nemoralis* is very abundant, being found in every part of the district, and crushed dead specimens are often found on pathways in the early morning.

ELAPHRUS CUPREUS Duft. Not uncommon on the margins of ponds. Baildon and near Cottingley Bridge. Banks of the Wharfe, Appletreewick, June 1900.

LEISTUS RUFESCENS F. Previous to 1903 my experience of this species led me to consider it almost a purely woodland insect, as I had always found it amongst moss and dead leaves in damp woods.

In June 1903, however, fine specimens were common under stones at the foot of walls which cross Rombalds Moor.

It is also recorded from 'Midgley Moor' by Dawson, probably on the authority of 'S. Gibson.'

NEBRIA GYLLENHALII Sch. Frequent on the high moors.

CLIVINA COLLARIS Herbst. So far I have only observed this species in one locality—Saltaire—where I have taken it two or three years in succession.

Its ally—*C. fossar* L. is more generally distributed.

BEMBIDIUM RUFESCENS Guer. Saltaire, 1903.

BEMBIDIUM NIGRICORNE Gyll. This rare northern species again turned up in 1903, 19th May on Harden Moor (a new locality), and on 2nd June on Rombalds Moor:

BEMBIDIUM DECORUM Panz. Very common at Burton-in-Lonsdale on the banks of the Greta, in shingle, 23rd May 1903, F. Jowett, W. Mann, and J. W. C.

BEMBIDIUM MONTICOLA Sturm. About half a dozen specimens on the banks of the Greta, Burton-in-Lonsdale, in similar situation to the last. F. Jowett, W. Mann, and J. W. C., 23rd May 1903.

BEMBIDIUM TIBIALE Duft. One on Simon Seat, in Wharfedale, 1886. Common on the banks of the Greta, Burton-in-Lonsdale, 23rd May 1803.

BEMBIDIUM ATROCÆRULEUM Steph. With the last on the banks of the Greta, Burton-in-Lonsdale, 23rd May 1903.

BEMBIDIUM ANGLICANUM Sharp. One on the bank of the Greta, near Ingleton, 1st June 1903.

BEMBIDIUM STOMOIDES Dej. During 1903 I had the pleasure of taking this rare British 'Bembid' on the banks of the river Aire at Saltaire. Between 28th April and 16th May I took about eighteen specimens. They were found under stones and in river sand, into which they burrowed immediately on being disturbed. It is quite an interesting addition to the Airedale beetle fauna.

PTEROSTICHUS CUPREUS L. Common on the banks of the Wharfe, Appletreewick, June 1900.

PTEROSTICHUS VITREUS Dej. Harden Moor (a new locality), 19th May 1903. Frequent on Rombalds Moor.

AMARA LUNICOLLIS Schiodt. One on Idle Moor, near Bradford, 1903, W. Mann. This—and other doubtful species—was kindly named for me by Mr. W. Holland, of the University Museum, Oxford.

PRISTONYCHUS SUBCYANEUS Ill. By no means an uncommon species in this district, occurring, not only in damp cottage cellars, but frequently found in the cellars of warehouses in the centre of the town.

ANCHOMENUS VIDUUS Panz. var. *MÆSTUS* Duft. One specimen, near Bingley, 1903. Evidently not common in the district.

ANCHOMENUS MICANS Nic. I took one example of this species on Baildon Moor, April 1903, the first I have seen in the district.

OLISTHOPUS ROTUNDATUS Payk. A common species on both Rombalds and Harden Moors.

CYMINDIS VAPORARIORUM L. This is another of the 'Midgley Moor' records, and although I have spent many half-days searching on Rombalds Moor for it, I have so far failed to find it in that locality. However, during a ramble with Mr. E. P. Butterfield on Harden Moor, near Bingley, on 19th May 1903, a glorious day, one of the few bright sunny days of last summer, I turned up a single specimen in that district.

MISCODERA ARCTICA Payk. This lingering relic of an Alpine fauna is extremely rare and local in this district. Since my first discovery of it in 1884 I have not found more than seven or eight specimens, although I have not worked for it every season. It seemed to be confined to an old disused quarry on the edge of Rombalds Moor and always found under *very small stones* embedded in the sand.

It is always a sluggish creature and does not run when exposed as the members of the Geodephaga usually do, but remains quite motionless.

On 2nd June 1903, however, Mr. F. Jowett in my presence found one under a large stone on the open moor very near to the old quarry where it was originally found, which is now filled up.

BRADYCELLUS COGNATUS Gyll. Absolutely swarms on our moors. On 19th May 1903 it was found very abundantly on Harden Moor, and on 2nd June perhaps in greater quantities on Rombalds Moor. It was no uncommon thing to see half a dozen under one small stone.

BRADYCELLUS HARPALINUS Dej. Common on both Harden and Rombalds Moor, 1903.

BRADYCELLUS SIMILIS Dej. Not so abundant as *B. cognatus*, but still occurring in great quantities on both Harden and Rombalds Moor, 1903.

LINCOLNSHIRE FRESHWATER MITES.

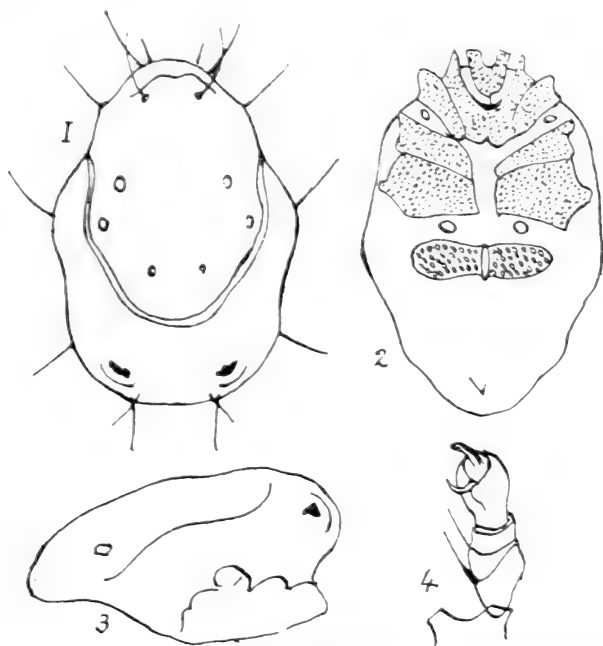
C. F. GEORGE, M.R.C.S.,

Kirton-in-Lindsey, Lincolnshire.

Arrhenurus longiusculus n.sp. This mite more nearly resembles *A. oblongus* Piersig than any other mite I know, being very nearly of the same length. If, however, Piersig's figure of that mite is compared with the one here given, which was drawn for me by Mr. Soar from my mite, the difference will be very apparent; in *oblongus* the widest part of the mite is in the anterior third, whilst in *longiusculus* it is a little below the middle, the external bristles also are remarkable, but perhaps

Naturalist

the most important difference is to be found in the genital plates, which are long and gradually become almost pointed, nearly embracing the under part of the abdomen in *oblongus*, whilst in *longiusculus* they are long oval, with the outer end rounded, and the inner, where it meets the genital orifice, is truncated, as in Fig. 2. The epimera and legs are a fine transparent blue, there are also patches of blue on the shoulders, and at the posterior end of the dorsum, the rest of the dorsal skin, though chitinous, is somewhat transparent, and the contents of the body show through it, giving it a mixed colour of red, brown, and



Arrhenurus longiusculus n.sp.

yellow, of no distinct pattern. There is a well-marked spur or process on the fourth joint of the last leg, and the palpi are somewhat remarkable, see Fig. 4. The length of the mite is 0.96 mm. I found it in August, 1903, in the Scawby fish pond.

Fig. 1 is the upper surface of the mite.

Fig. 2, under surface.

Fig. 3, side view.

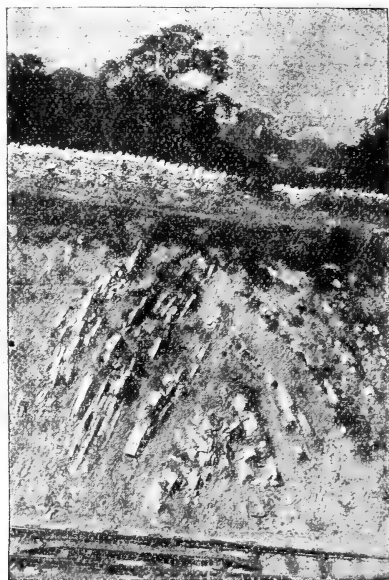
Fig. 4, under surface of palp.

Legs not figured. The eyes are bright crimson.

REVIEWS AND BOOK NOTICES.

ETON NATURE STUDY. PART I.

The recent appreciation of the value of the study of Nature as part of the education of the child has resulted in the production of an enormous number of books, of varying worth, dealing with 'Nature study.' Of some



Section in Limestone, near Ashbourne, Derbyshire.

of these it can be truly said they are of little or no use. Eton Nature Study, Part I., by M. D. Hill and W. M. Webb (Duckworth & Co., 3s. 6d.), is not of this class. It is a work which precisely explains the methods of



A Dormouse.

teaching on the right lines. It covers almost every branch of natural history likely to be taken up by the young student, and is profusely illustrated by diagrams and photographs. Whether speaking of clouds, leaves, fungi, mammals, timber, or the earth's crust, the authors say what they have to say, and say it well. Two of the illustrations are shown herewith by the courtesy of Messrs. Duckworth & Co., who are to be congratulated on being able to produce so useful a book at such a low figure.

◆◆◆

Bird Life in Wild Wales. By J. A. Whalpole-Bond. (F. Fisher Unwin, 7s. 6d.). Books dealing with bird life seem particularly plentiful just now. The present work, however, covers a district but little traversed by writers on this fascinating branch of natural history—a district where the Raven and the Buzzard still occur in fair abundance, and where the Fork-tailed Kite may still be seen. The principal part of the work refers to the county of Brecon, though other areas are referred to—some not in Wales at all. The author has done good work in protecting some of the rare species—particulars of which are given. All who take an interest in



Moorhen's Nest.

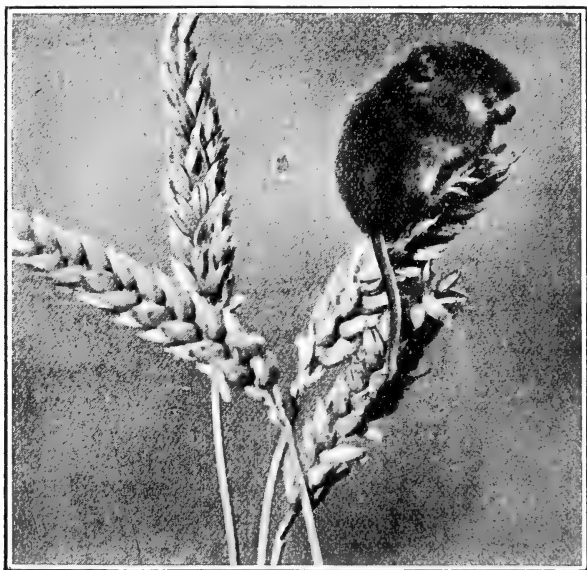
bird life should certainly see this book—if only for the beauty of the numerous illustrations—reproductions of photographs of birds, nests, and eggs. One of these has been kindly lent us by the publisher. The author would have done well to have allowed some friend to read his proofs, as certain repetitions might then have been prevented—though these are of minor importance. If we might be allowed to say so, the only part of the book we really do not like (and this applies to almost any book) is the photograph of the author as a frontispiece, though in the present instance some additional interest is given to the illustration on account of a 'young Buzzard, Badger, and Jays' being included.

◆◆◆

Mr. J. E. Marr's latest book, 'Agricultural Geology' (Methuen and Co.), is hardly up to standard attained in his former works. But it appeals to a different public. It has been written, after study of the schedule framed for the guidance of candidates for the International Diploma of

Agriculture, to be used by students who are reading for examinations in agriculture, though it may be found useful to others.' The various chapters are usually concisely and clearly written, and well illustrated by diagrams, etc. To the student there can be no question the work will be particularly valuable, especially that part dealing with 'geological surveying,' a subject Mr. Marr is well able to handle. A coloured geological map of the British Isles forms the frontispiece.

We know of no more suitable book for presentation to an intelligent child than 'Wee Tim'rous Beasties,' by Douglas English, recently published by Bousfield & Co., London (5s.). The simplicity and interest of the narratives, the numerous beautiful illustrations, and the general 'get-up' of the book are bound to fascinate the reader. What is perhaps of more



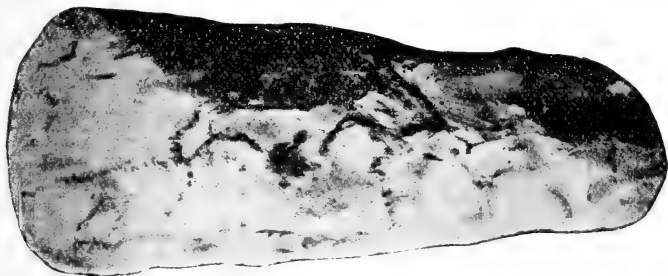
Harvest Mouse.

importance, the subjects dealt with are usually such that a child is familiar with—Sparrows, Rats and Mice, Squirrels, Butterflies, Newts, etc. Each tells its own story—that of '*Mus ridiculus*' being particularly pathetic. Some of the chapters had previously appeared in certain popular magazines. Messrs. Duckworth & Co. have enabled us to reproduce one of the illustrations.

Messrs. O. E. Janson & Son, 44, Great Russell Street, W.C., have just published a 'Catalogue of British Coleoptera,' by T. Hudson Beare and H. St. J. K. Donisthorpe. It is eleven years since Sharp and Fowler's last Catalogue was issued, hence the appearance of the present list is justified. The new list contains about 60 names not occurring in the 1903 catalogue, and 43 are removed from the general catalogue to the 'doubtful and introduced' list. It is sold at the low price of one shilling.

Naturalist,

Mr. Elliot Stock has recently published a fascinating work by W. Johnson and W. Wright, dealing with 'Neolithic Man in East Surrey' (6s.). Whilst the book is principally confined to this charming piece of country, it is of more than local interest. The introductory chapters, for example, dealing with 'The Sequence of Races in Britain,' 'Neolithic and Bronze-using Races of Britain,' etc., might be read with profit by any student of the past. Besides being a readable summary of our knowledge of the subject, these chapters have the advantage of being reliable. In reference to 'pigmy flints' it is refreshing to read that the authors, who have collected



Polished Flint Axe.

minute flint implements from Scunthorpe and other places, nevertheless are of opinion that 'The notion that these flints were fabricated and used by a race of diminutive men may at once be dismissed.' Apparently the district described is not particularly prolific in implements, as the axe-head figured herewith, presumably of flint, is the best discovery in the neighbourhood. Hundreds of specimens of the same type, but finer, have been picked up on the Yorkshire Wolds. The authors are therefore to be all the more congratulated on the success of their work. To the publisher we are indebted for the loan of the block.

FIELD NOTES.

MAMMALS.

Otter near Grimsby.—On 1st February, whilst on a visit to Grimsby, Mr. Alfred Stephenson kindly showed me a fine specimen of a dog Otter which had been shot by Mr. W. Myers on a small stream (Barnaby Beck) some six or seven miles from Grimsby. It weighed 23 pounds without entrails, length from nose to tip of tail 49 inches, skull $12\frac{1}{2}$ inches, circumference of neck 14 inches, root of tail $7\frac{3}{4}$ inches, muscle of fore leg $8\frac{3}{4}$ inches. Personally I am sorry this animal has been destroyed, as it is far better to behold it alive, if only for a few seconds at a time, than to be the poor possessor of the stuffed skin of a once beautiful creature.—W. H. PARKIN, Shipley.

BIRDS.

Structure of a Rook's Nest.—A gale sprang up on Friday, 1st April, and continued with little break till late on the evening of the 7th. A number of Rooks' nests were blown out of the

different rookery trees in this parish. I examined these fallen constructions, and could not help admiring the skill and ingenuity with which they were built. Some were so well entwined that, after a fall of 40 feet they were practically sound. Speaking generally, the twig construction, both the larger bottom layer and the smaller upper binding, was of hedge Whitethorn (*Cratægus monogyna*) cuttings, green and supple from the trimmed or laid fences; with here and there an Ash (*Fraxinus excelsior*) or Wych Elm (*Ulmus montana*) twig, snipped or sawn off by the Rook's powerful beak. Over 30 years ago I examined nests and found them wholly constructed of Ash. There was not at that time the frequent late spring hedge-cutting we have now. The lining was as purely agricultural as the construction materials. It shows the modern rook takes things easy if a supply of fitting stuff is easily obtained. Twitch ((1) *Agrostis stolonifera* of the arable-peat, and (2) *Agropyron repens* of the arable-clays) was the staple commodity. Both these common grass-roots abounded, the first being predominant. Mixed with them were Oat and Wheat straw and Beech (*Fagus sylvatica*) leaves, the whole being bound together by Sheep's wool and dung. I mention this latter point especially, for Mr. Howard Saunder's 'Manual' says, 'but seldom—if ever—any wool.' Here the Rooks use a quantity.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 9th April 1904.

MOLLUSCS.

***Helix virgata* var. *leucozona*, at Cadney, Lincolnshire.**—On the 21st of March while out botanising, I took a dead specimen of *Helix virgata* var. *leucozona* on the freshwater alluvium of Cadney Beck. It is the darkest purple violet, and far finer than my Tenby specimens. Mr. Taylor verified it. Has anyone any notes on the food plant or plants of this variety?—E. ADRIAN WOODRUFFE PEACOCK.

Slime Spinning by *Sphærium corneum*.—Amongst various freshwater mollusca I put into a glass globe, containing water, on 1st April, were some *Sphærium corneum*. On the following day I observed one of these crawling up the side of the globe and afterwards along the surface of the water. On Monday I found it suspended for some time, about one inch below the surface of the water, by means of a mucous thread.—C. S. CARTER, Louth, 12th April 1904.

LEPIDOPTERA.

***Biston hirtaria* at Scarborough.**—Mr. A. S. Tetley writes me that he took a fine male specimen of *Biston hirtaria* in Rain-cliff Wood, Scarborough, in April 1902, thus confirming the old record for the species in that locality. It is rarely met with anywhere in the North of England, though it occurs in Scotland and in the southern counties of England, especially in the London district, where it is abundant.—GEO. T. PORRITT, Huddersfield, 4th April 1904.

***Gonepteryx rhamni* in North-west Lindsey.**—On Easter Day morning, 3rd April, returning from Howsham Church, I passed along the north side of Howsham Wood to see if the violets were yet empurpling the ground as in some former springs, and saw a perfect male specimen of *Gonepteryx rhamni*, no doubt drawn from its hybernating place by the bright sunlight. Though common enough all along the wooded portion of the Lincolnshire Limestone, where *Rhamnus catharticus* is fairly rare, I have never seen a sign of it here, though I have looked out for it early and late during the last 13 seasons where its food plant abounds on the boulder clay. It seems strange, but in this part of Lincolnshire I only know as a matter of fact that one female has been taken. Mr. F. George, of Kirton-Lindsey, took it years ago. Neither my father nor I have ever seen it on the wing in Lincolnshire.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 4th April 1904.

***Dicranura bicuspis* as a Scarborough Moth.**—The late Mr. Thomas Wilkinson used to take this rare and beautiful species regularly and in some numbers at Scarborough: and up to about 1870 it was occasionally taken by other lepidopterists in the district from York to the East Coast, and also in Cleveland. Mr. Wilkinson died in 1876, since which time, so far as I know, no one has ever seen the species in our large county. What has become of it? No one can doubt that it is still with us, and it is almost certain that it only wants well working for to be turned up again. Mr. Wilkinson gave me the species from Scarborough, and used to tell me he could always find it. I made several attempts to discover its larva myself when at Scarborough last August, but without success. Its food, alder, however, is so abundant almost everywhere in the district that one felt it was almost like looking for the proverbial 'needle in a haystack.' In all probability Mr. Wilkinson used to find it in one particular spot, and it is to try to induce the Scarborough

lepidopterists to do their utmost during the present season to discover that spot, that I write this note. *Bicuspis* feeds on birch as well as alder, but, compared with the latter, birch seems to be a much less common tree at Scarborough. Both should be worked, and the moth ought to be looked for on the trunks from the middle of May to the middle (or even later) of June; the larvæ on the leaves and twigs from the end of July to the middle of September.—GEO. T. PORRITT, Huddersfield, 4th April 1904.

***Ophiusa stolidus*.**—Should my old friend Mr. Porritt not have written *Leucanitis stolidus* (Staudinger, ed. 1871, p. 136) or *Grammodes stolidus* (Guenée, ed. 1852, p. 276) instead of *Ophiusa stolidus*? ('The Naturalist,' December 1903, p. 461). It is of light build $1\frac{1}{4}$ inch expanse, both wings light violet brown, with a prominent light band through both wings. Staudinger gives its habitat as Europe m. (except Russia and ? Andalusia), Carniola, Northern Africa, Asia Minor, and ? Armenia. Guenée adds Dalmatia, Italy, Southern France, Senegal; and Emmerton Gurrant reports it from Ceylon. Two of my specimens (now in the Hull Museum) are from Asia Minor; the origin of a third is unrecorded, but it does not differ. Guenée quotes the larva as feeding on briar, and says 'assez rare,' but as I paid only about 2s. 6d. each for mine it seems fairly plentiful with better research.—N. F. DOBREE, Beverley, East Yorkshire.

I think not, although in these days of constant absurd changes in nomenclature it is difficult to know what is right outside one's own special department. I can find no reference whatever to *Leucanitis* in my book on European Lepidoptera, and, as the moth was made out as *Ophiusa stolidus* both by Mr. C. G. Barrett and myself, altogether independently of each other, it may be taken, I think, that it is generally known by that name.—G. T. P.

CRUSTACEA.

***Euthemisto compressa* (Goës) on the Holderness Coast.**

—This interesting crustacean was abundant, dead and alive, on the tide mark at Withernsea and southwards, on 8th April 1904. It was first taken on the British coast by Mr. T. H. Nelson in February 1892 (see Nat., June 1892, p. 175), and identified by Canon Norman (Ann. and Mag. Nat. Hist., Ser. 6, Vol. 9, p. 463). In the same journal, Ser. 7, Vol. 5, p. 132, Canon Norman

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states that it has also been taken '70-80 miles east by north of the mouth of the Humber (Stebbing).' In February 1903 three specimens from Mr. Nelson were sent to me which I forwarded to the Natural History Museum, South Kensington, as I had no description of the species. These were returned unnamed, with the information that 'the trustees do not approve of the time of the assistants being taken up by determining badly-preserved specimens of common objects of the shore.' It is quite probable they did not possess a British example of this species. There is apparently no explanation of its periodic occurrence on the Yorkshire coast in such quantity.—T. PETCH, Hedon.

***Euthemisto compressa* at Redcar.**—At the request of Mr. T. H. Nelson I send you herewith specimens of this crustacean, which was cast up in enormous quantity on the sands at Redcar on Tuesday, 8th March.—(Canon) A. M. NORMAN, Berkhamsted, Herts.

NORTHERN NEWS.

There are various notes on the shells of Lancashire and Cheshire in the April 'Journal of Conchology.'

Montagu's Sucker (*Liparis montagui*) is recorded at Scarborough by Mr. W. J. Clarke in the April 'Zoologist.'

Dr. W. E. Hoyle has just issued a third edition of his penny 'Handy Guide' to the Manchester Museum, Owens College.

The fiftieth anniversary of Sir H. E. Roscoe's graduation at Heidelberg was celebrated at Manchester on the 22nd of April.

Mr. John Postlethwaite, of Keswick, has presented his collection of fossils from the Skiddaw Slates to the British Museum (Natural History).

Mr. A. Burnet gives some localities for chalk fossils in North Lincolnshire, and traces out some of the zones, in the April 'Geological Magazine.'

Mr. T. Barker has a note on *Tortula rigida* and *T. brevirostris* in the 'Revue Bryologique,' No. 2, 1904, in which it is suggested that they may really be varieties of the same species.

The Salford Corporation propose to transfer the scientific collections in the Peel Park Museum to a building at Brill Hill, which will answer the purpose of a museum and refreshment room.

On the invitation of the Executive Committee of the Yorkshire Naturalists' Union, Mr. G. W. Lamplugh, F.G.S., of H.M. Geological Survey, has accepted the Presidency of the Union for 1905.

'From a Solway Notebook' is the title of an interesting paper by Mr. Robert Service, M.B.O.U., in the April 'Annals of Scottish Natural History.' He treats of the effect of the weather of 1903 upon the mammals, birds, and fish of the district.

The North of England Institute of Mining and Mechanical Engineers has just issued a 'Subject-matter Index' of mining, etc., literature for 1901, under the editorship of Mr. M. Walter Brown. Nearly a thousand publications have been searched in connection with this work.

The Rev. H. J. Riddelsdell, of St. Michael's College, Aberdare, Glam., is collecting material for a County Flora of Glamorgan, and would be glad to have any suitable herbarium records, or plant lists, or references to sources of information of which he is not likely to know.

Mr. P. G. Ralfe, of Castleton, Isle of Man, who is preparing a book dealing with the birds of the island, would be glad of any information dealing with the following:—Whinchat, Garden Warbler, Lesser Whitethroat, Wood Warbler, Dipper, Twite, Merlin, Rock Dove, the species of Grey Geese and sea-frequenting ducks.

In 'Nature Notes' for April, Mr. W. P. Westell contributes some very elementary 'Nature Notes from Mablethorpe.' The author admits his 'notes are quite unpretentious and to some may be considered prolix observations.' We are evidently amongst that 'some,' as we are unable to call attention to a single observation likely to interest our readers.

The Rev. Canon Greenwell, F.R.S., F.S.A., who so long ago as 1877 published his well-known 'British Barrows,' has just celebrated his jubilee as a Minor Canon of Durham. In addition to his occupying a foremost position in the archæological world, Canon Greenwell is a field naturalist and an expert angler. 'Greenwell's Glory,' a famous trout-fly, is his invention.

Dr. G. J. Hinde contributes a paper 'On the Structure and Affinities of the Genus *Porosphaera*' to the 'Journal of the Royal Microscopical Society,' just issued. These curious rounded fossils were figured in 1829 by Phillips as *Millepora globularis*. Dr. Hinde relegates these organisms to a position in the *Lithonina* group of Calcisponges. In the Flamborough chalk the various species of *Porosphaera* are uniformly of small dimensions in all the zones, in marked contrast to those from the higher zones on the south coast.

The following premiums offered and paid for destroying birds of prey, etc., in the Island of Arran, by Douglas, Duke of Hamilton and Brandon, so early as 1779, may be of interest to ornithologists:—An Eagle, 7s. 6d.; for the nest of an Eagle, 10s. 6d.; a Game Hawk, 2s. 6d.; for the nest of a Game Hawk, the young ones alive, 10s. 6d.; a White Kite, 2s.; for the nest of a White Kite, 5s.; a Common Kite, 1s.; for the nest of a Common Kite, 2s. 6d.; a Raven, 2s.; for a Raven's nest, 10s. 6d.; a Hooded Crow, 6d.; for a Hooded Crow's Nest, 1s.; for a Cat shot on the Muir, 1s.

A fourth edition of Murray's well-known 'Handbook for Yorkshire' has just been issued by Edward Stanford. It has been edited by J. W. Waller, F.S.A., of Wakefield, who has been successful in bringing the work fairly up to date. Although it contains over 600 pages, and numerous maps, plans, etc., the book is small and will easily go into the pocket. The pages devoted to geology, botany, etc., are exceedingly few, but are, perhaps, sufficient for the purposes of the average tourist, for whom the guide is evidently intended, and to whom it will be exceedingly useful, if not indispensable.

In order to meet the convenience of the local societies the date of the Hebden Bridge Excursion of the Yorkshire Naturalists' Union has been altered to Saturday, 11th June. It has also been found advantageous to transpose the dates of the Buckden and Dent excursions. The amended programme for 1904 therefore is as follows:—

Harwood Dale, 21st to 23rd May (Whit week-end).

Hebden Bridge, 11th June.

Spurn, 2nd to 4th July.

Buckden, August Bank Holiday week-end.

Dent, 3rd September.

Upper Teesdale (Fungus Foray), 24th to 29th September.

The annual meeting will be held at Leeds in January.

Naturalist.



15 MAY 1904

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NOMENCLATURE RULES.—The Nomenclature adopted in *The Naturalist* will be—as far as possible—in accordance with the latest standard list or monograph, with such alterations as are necessary to bring the name into accordance with the strict law of priority.

CAPITALISATION OF SPECIFIC NAMES.—Hitherto the rule of *The Naturalist* has been the Zoological one, that specific names shall invariably commence with a small letter, never with capitals. Henceforth this rule will still apply to all Zoological names, but in deference to the wishes of our botanical contributors the specific names of plants will conform in this respect to the standard catalogue or monograph in each branch of botany.

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PUBLICATIONS RECEIVED.

Guide to the Hull Museum.

Records of the Australian Museum, Vol. 5, Nos. 2 and 3.

La Nuova Notarisia, Aprile.

New Mexico College of Agriculture, etc., Bulletins, Nos. 48 and 49.

Bulletin: New York Botanical Garden, March.

Hull Museum Publications, No. 19, March.

Animal Life, April.

The Oolitic and Cretaceous Rocks South of Scarborough.

Naturæ Novitates, Nos. 4, 5, 6, and 7, 1904.

Proceedings Geologists' Association, Vol. 18, Parts 5 and 6, 1904.

Entomologist, May 1904.

Nature Study, May 1904.

Le Mois Scientifique, Avril 1904.

Irish Naturalist, May 1904.

Geelong Naturalist, March 1904.

Ornithologisches Jahrbuch, April 1904.

Nature Notes, May 1904.

Journal of Malacology, 25th April 1904.

La Feuille des Jeunes Naturalistes, Mai. 1904.

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Proceedings Academy of Natural Sciences of Philadelphia, Vol. 55, Oct.-Dec. 1903.

Knowledge and Scientific News, May 1904.

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NOTES AND COMMENTS.

CLEVELAND NATURALISTS' FIELD CLUB.

The 'Record of Proceedings, 1902' (Vol. 1, No. 5) of the Cleveland Naturalists' Field Club, though rather late in the day (published 1904), are none the less welcome, as to a large extent they are confined to papers and notes dealing with the Cleveland area. Much space is devoted to two interesting papers dealing



Dictyozamites Hawelli Seward.

Pinnæ $\frac{1}{4}$ inch larger than actual size.

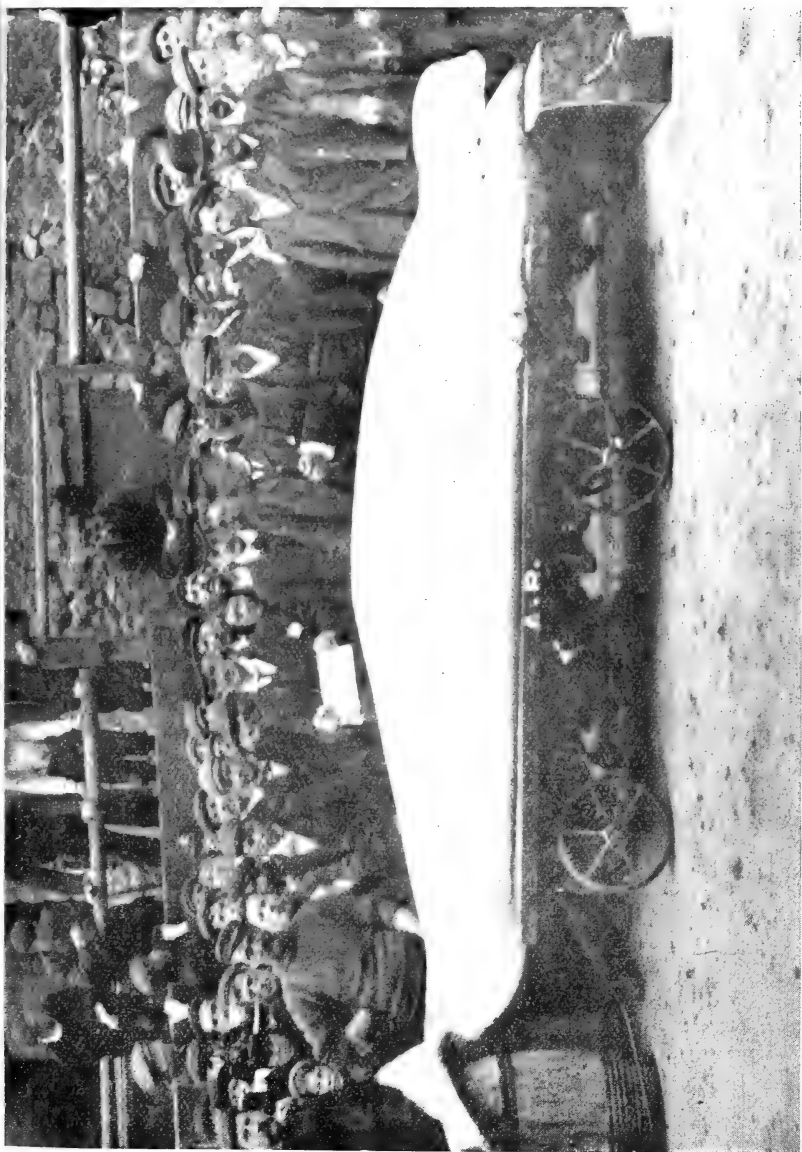
with Church history, etc., which hardly come within the scope of the naturalist. 'Flint Jack, his Life History,' by W. G. Clarke, is reprinted from the 'Transactions of the Norfolk and Norwich Naturalists' Society.' This 'very prince of fabricators of antique' has, we regret to say, more than one disciple amongst us yet. The natural history notes in the volume, some of which are of especial value, are as follows :—'Bird Nests in Strange Places,' 'Some Notes on the Food of the Hedgehog,' 'The Grasshopper

Warbler at Middlesbrough,' and 'Early Appearance of the Redwing,' by the late R. Lofthouse; 'The Little Bunting at Tees Mouth,' by C. E. Milburn; 'Cleveland Lepidoptera,' by T. A. Lofthouse; 'Some Notes on Local Lepidoptera,' by the late R. G. Clayton; 'Coleoptera Observed in Cleveland,' by M. L. Thompson; 'Submerged Forest and Peat Beds at Redcar,' by H. Simpson; and 'Rainfall in 1902.' The Editor (the Rev. J. Hawell) contributes 'Bajocian Plant Beds of Yorkshire,'* illustrated by a figure of a specimen of *Dictyozamites Hawelli*, which we are able to reproduce herewith. The price of the publication is 2/-. We trust that the next balance sheet issued will show a greater amount than the last under the head of 'Transactions sold.'

NEWCASTLE NATURALISTS.

In consequence of the recent amalgamation of the Tyneside Naturalists' Field Club with the Natural History Society, a new series of the 'Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne' has been started, and Vol. 1, Part 1, 1904, price 2s., makes its appearance. The first page is devoted to a summary of the publications of the two societies, from 1829 onward, which will be useful to bibliographers. Mr. A. Meek contributes a valuable paper 'On the Fishes of the North East Coast,' which includes particulars of some additions to House's well-known Catalogue of the fishes of Northumberland and Durham. This paper describes the capture of the Sharp-tailed Lumpenus (*Lumpenus lampetiformis* Walb.), for the first time in England. It was taken at Cullercoats, at extreme low-water mark, on 12th February 1903. Mr. G. S. Brady gives 'Notes on Entomostraca found at the Roots of Laminariæ,' with two plates. This includes the description of a new species, *Argillæcia propinqua*, taken in depth of 59 fathoms, 29 miles east of Alnmouth. Mr. Meek has a second note describing a Beluga, or White Whale, caught at the mouth of the Tyne in June 1903, the skeleton of which is now in the Newcastle Museum. It is pointed out that the species had not previously been recorded south of the Forth (in 1815), but that the fishermen have reported seeing another example on various parts of the north-east coast during the summer. Possibly this is the specimen recorded at Scarborough in August last by Sir R. L. Patterson ('Naturalist,' September

* See 'The Naturalist,' 1903, p. 227, and pp. 312-317.



Beluga caught at the mouth of the Tyne, June 1903.
(One foot is indicated on the piece of paper held up behind the animal.)

1903, p. 348). The society has kindly enabled us to reproduce the illustration of this capture.

Whilst the society is to be congratulated on the continuance of its valuable publications, and the preference given to papers of local interest, we cannot compliment the editor on the longest paper in the volume, viz., that on 'Ancient Egypt.' Not that there is anything wrong with the paper itself—it appears to be admirable in its way, but it is certainly out of place in a local publication—and would have been better if included amongst the 'Abstracts of Lectures' given at the end of the volume. What student of Egyptology would think of examining a file of Transactions of this Natural History Society for a paper dealing with the ruins of Karnak?

LITERARY AND PHILOSOPHICAL SOCIETIES.

At the recent Annual Meeting of the Leeds Philosophical and Literary Society, the President (Prof. A. Smithells) had occasion to complain of the lack of interest and support given to the Society. The present membership of the Society is 356; in 1890 it was 574, and in 1870 643. There is a deficit of over £100 on the past year's balance-sheet. There is a considerable falling off in the number of visitors to the Museum as compared with the average number of visitors for the previous ten years. Were it not for the large income derived from letting the Society's rooms it is difficult to say what position it would be in. Yet this particular function was hardly the *raison d'être* of the Society, and certainly several of those hiring the rooms can hardly be looked upon as either 'Literary' or 'Philosophical.' There can be no question that the days of the old 'Lit. and Phils.' are over. Their work is done in other ways and by other societies. Times have changed since they were founded. The Leeds Society only occupies the position of dozens of others. Some have succumbed altogether to the changed conditions. Others have developed into popular lime-light lecture and concert-providing institutions, letting off their rooms to spiritualistic meetings, for 'health' lectures by quack doctors, political meetings, or for any purpose under the sun so long as the hire of the room is paid. As a rule the Society's Museum becomes a burden to the funds, and suffers. Where it can be handed over to the town this should be done. It has been done in some towns with good results. Doubtless the Leeds Museum could be made still more useful under some such conditions.

THE PLANTS OF PECKET WOOD.

C. CROSSLAND, F.L.S., AND J. NEEDHAM.

PECKET WOOD is one of those numerous stretches of woodland, probably remnants of original forest, which flank the valleys of the river Calder and its numerous tributaries. Like most of its *confrères* Pecket Wood occupies a steep, rugged hillside unfit for any other economic purpose. It lies on the Wadsworth side of the Hebden Valley above Hebden Bridge, on the Keighley and the Hardcastle roads. Its situation is at a bend in the valley opposite the towering Heptonstall, and has a western aspect. The geological formation is millstone grit with its alternate beds of shale and grit rock. There is a bold escarpment at the top of the wood (Gallstones) from which at various times huge blocks of grit have been detached by denudative undermining, and are now strewn about the wood.

The average fall of the ground is equal to 1 in 2, from 850 feet at Gallstones to 475 feet in Midgehole Road, a distance of 766 feet. The wood is rather over half a mile long, and 250 yards broad in its widest part, covering about 35 acres. It is separated from Midgehole Wood by a boundary wall beginning in Midgehole Road and ending at Nab Nook in Pecket Road. It is named Spring Wood on the Ordnance Survey. Two or three small rills run down it, but have cut only shallow courses.

We have investigated this wood for the last 15 years (1888-1903), more particularly for its moss and fungus floras. In the meantime we have gleaned many particulars respecting its general flora, with the exception of the Algæ, and now propose to include these observations with those on its mosses and fungi. We do this the more readily because, so far as we know, very few places in any locality have been so thoroughly overhauled for their botanical productions.

For some reason or other, possibly by being largely excluded from the south, the Pecket Wood and Hardcastle districts are at least a fortnight behind Elland Park Wood, 7-8 miles lower down the Calder Valley, with their vegetation.

To get an idea of what the wood fostered in the way of fungi it was found necessary to devote at least a decade to it, fresh things making their appearance continuously year after

year. With mosses it was different, nine-tenths were found in the first year. The wood bore a similar general appearance each successive season until the spring of 1903, when a number of trees were cut down and left it much more open. What effect this change will have on shade-loving plants remains to be seen.

The Hebden Bridge and Keighley turnpike traverses its whole length, cutting it into two unequal halves. The upper one is smallest and driest, and partakes of the nature of an open, heathy woodland. The plant associations here are characteristic of such places in this district. The trees are oak, birch, and planted scots pine. Oak is most prevalent, except near the escarpment, where birch is in the ascendant. At one time birches may have been most plentiful generally, as the old quarry up the roadside has long been known as 'T' Birks delph.'

The other vegetation is principally composed of hair-grass (*Deschampsia flexuosa*), bracken (*Pteris aquilina*), ling (*Calluna Erica*), bilberry (*Vaccinium Myrtillus*), male-fern (*Nephrodium Filix-mas*), broad-buckler-fern (*Lastræa dilatata*), and lady fern (*Athyrium Filix-fœmina*). Hair-grass is the dominant grass, if not the dominant plant. The thin sheets of weedy bracken give place northward to scattered tufts of male-fern and broad-buckler-fern; the lady fern occurs in the damper places near the water-courses with small beds of the great wood-rush (*Luzula maxima*). Ling, in patches mingled with, or free from, bilberry; an occasional plant of straggling cowberry (*Vaccinium Vitis-Idæa*), with here-and-there small loose bunches of fine-leaved heath (*Erica cinerea*), and cross-leaved heath (*Erica Tetralix*) make up a typical flora for this kind of situation and ground. The bilberry often appropriates the soil-capped, half-embedded rocks. There are a few graceful broom-bushes (*Cytisus scoparius*) and odd plants of hard fern (*Lomaria Spicant*), and common polypody (*Polypodium vulgare*). The stag's-horn club-moss (*Lycopodium clavatum*) was formerly here but has recently disappeared. This rocky and heathy piece of woodland has yielded two rare species of fungi—*Lycoperdon flavosum* and *Strobilomyces strobilaceus*. The heath-loving wood-rush (*Luzula erecta*) secures a few inches to each tuft towards the roadside. Woodbine (*Lonicera Periclymeum*), willow (*Salix Caprea*), and brambles (*Rubus* spp.) are mostly confined to the roadside bank; this and its supporting wall, which are rather moist in many places, harbour a fairly abundant flora.

On the drier portions of the bank are :—

<i>Viola Riviniana.</i>	<i>Bellis perennis.</i>
<i>Cerastium triviale.</i>	<i>Hieracium Pilosella.</i>
<i>Stellaria Holostea.</i>	<i>Teucrium Scorodonia.</i>
<i>Fragaria vesca.</i>	<i>Rumex Acetosella.</i>
<i>Potentilla Fragariastrum.</i>	<i>Luzula vernalis.</i>
<i>Potentilla sylvestris.</i>	<i>Luzula campestris.</i>
<i>Potentilla reptans.</i>	<i>Luzula erecta, etc.</i>
<i>Galium saxatile.</i>	

MOSSES.

<i>Dicranella heteromalla.</i>	<i>Webera nutans.</i>
<i>Dicranella cerviculata.</i>	<i>Mnium hornum.</i>
<i>Dicranoweisia cirrata.</i>	<i>Bryum cæspiticium.</i>
<i>Dicranum fuscescens.</i>	<i>Bryum capillare.</i>
<i>Barbula unguiculata.</i>	

A few of both sections grow also in the wall crevices.

On the moister portions are :—

<i>Geranium Robertianum.</i>	<i>Lactuca muralis.</i>
<i>Hypericum pulchrum.</i>	<i>Hieracium boreale.</i>
<i>Hypericum tetrapterum.</i>	<i>Lysimachia nemorum.</i>
<i>Heracleum Sphondylium.</i>	<i>Urtica dioica.</i>
<i>Scabiosa succisa.</i>	<i>Luzula maxima.</i>

Plants which do not disdain the gutter along the base of the wall are :—

<i>Ranunculus repens.</i>	<i>Lactuca muralis.</i>
<i>Bursa Bursa-pastoris.</i>	<i>Plantago major.</i>
<i>Stellaria media.</i>	<i>Plantago lanceolata.</i>
<i>Tussilago Farfara.</i>	<i>Rumex Acetosella.</i>
<i>Senecio vulgaris.</i>	<i>Poa annua.</i>
<i>Taraxacum officinale.</i>	<i>Poa pratensis.</i>

The mosses of this wall are included in the general list of wall mosses to avoid over much repetition.

Before dealing with the features prevailing in the lower part of the wood it may not be amiss to survey the flora of the boundary walls and roadside rocks, principally moss, on both the Pecket and Hardcastle Roads. The walls are built of the local grit with the even 'topstones' lime embedded. They are more or less 'draped' with moss, which is the most luxuriant and attractive between November and May.

On the almost bare stone are :—

<i>Blindia acuta</i> (wet wall).	<i>Eurhynchium confertum.</i>
<i>Grimmia apocarpa.</i>	<i>Amblystegium serpens.</i>
<i>Grimmia pulvinata.</i>	<i>Hypnum uncinatum.</i>
<i>Brachythecium velutinum.</i>	Var. <i>plumosum.</i>
<i>Brachythecium populeum.</i>	Var. <i>plumulosum.</i>
<i>Brachythecium plumosum.</i>	<i>Hypnum cupressiforme.</i>
<i>Eurhynchium murale.</i>	

With a thin bedding of soil:—

Ceratodon purpureus.

Tortula muralis.

Tortula subulata.

Barbula rigidula.

Barbula unguiculata.

Barbula convoluta.

Encalypta streptocarpa.

Leptobryum pyriforme.

Barbula fallax.

Bryum pallens.

Bryum argenteum.

Many of the above grow in other situations as well. The last often covers long strips of ground at the base of roadside walls.

The lower portion is an ordinary mixed deciduous wood of a moister nature than the upper, but not sufficiently moist to exclude either bilberry or ling. In addition to the small rills which enter beneath the road at the top, the surface water from the road is run into the wood at pretty regular intervals; these places are marked by a sandbank in the wood behind the wall. Taken altogether, it is at a mean between a dry and a damp wood. Bracken, ling, bilberry, hair-grass, and their companions oak and birch all find their way down here and thrive well; in fact, the two latter with sycamore embrace by far the major part of the timber trees. The other timber trees are beech, wych-elm and ash, sparingly distributed. The smaller trees and the shrubs, all mostly near the Pecket Road, are mountain-ash, bird-cherry, hazel, elder, guelder rose and wild rose. There is a much more varied flora than in the upper part. The south end is very open; the few trees left are oak, and these wide apart; here the ground flora is anything but typical of a woodland. Its present open character has encouraged *Anthriscus sylvestris* to enter into keen competition with hair-grass, spreading soft-grass (*Holcus mollis*), stitchwort (*Stellaria Holostea*), hedge woundwort (*Stachys sylvatica*), etc. The wood is being still further opened out. In February and March last year quite a quantity of oak, birch, sycamore, and an ash or two were cut down. How this will affect shade-loving plants remains to be seen. Most of the trees felled were of medium growth: oak, 25-28 inches in girth; sycamore, 32-36 inches, 3 feet from the ground, birch much less. The sycamores in wet places near the water-runs appeared to have grown quickest, their rings of wood being much coarser. The woodman stated that this is usually so, so far as his observations go. The newly cut stumps, of the birches especially, furnished most interesting object-lessons of the power of root-pressure in forcing up the mineral-charged water or sap taken up by the living cells of the root-hairs. The same day or the

day following the felling of the trees sap began to ooze from the surface of the stumps and to drip copiously as a semi-transparent fluid for a few days over their lower edges. Probably this was the best time of the year for seeing this phenomena.*

A moist part of the wood towards the north end is occupied almost exclusively by tall, closely-planted young sycamores.

Here, in the absence of clusters of beeches, there does not appear to be any special connection between any particular tree and its undergrowth; shade or openness, and the dampness or dryness of the ground regulates to a large extent the disposition of the woodland plants. The soil throughout is a mixture of disintegrated grit, grit shale, and humus.

The light and shade (prior to 1903), the moist and dry banks, the shelter of the grit blocks, and the various combinations of these, along with the water runs, induced a fairly rich miscellaneous woodland flora. The dominant vegetation in the general carpet of the wood consists of the two social plants—hair-grass and spreading soft-grass. These appropriate large patches between them; hair-grass, as a rule, taking the higher, opener, and drier situations; spreading soft-grass the lower and moister places. We say as a rule, because these plants are not tied down by any hard and fast line from which they cannot deviate; hair-grass can grow anywhere (except in rich cultivated land), though varying conditions of environment influence its habit. It is most at home and most robust in a dryish, open, heathy woodland. Hair-grass and soft-grass can and often do mingle with each other in mixed woodlands, and are about the only two plants which can withstand the dense shade of the beech when that tree is present. They also occasionally form a distinct boundary between each other. Further, hair-grass caps the grit blocks, soft-grass does not.

The two grasses are not equally friendly to the bluebell (*Scilla festalis*) here. Where hair-grass is densest bluebells are prohibited, though the subsoil is quite suitable to the latter. They can compete to a certain extent with this grass where it is thinner and scattered, but the bluebells even then are below the general standard of growth, being weaker and fewer flowered. They do better among soft grass, best of all when they have the ground to themselves. They do not occur in wide,

* In about a week after the first oozing out of the sap, bright yellow patches began to appear in the translucent liquid jelly; one of these was cut out and taken home to develop; on the following morning it was found to be covered with the sporangiferous hyphæ of *Mucor mucedo*.

unbroken sheets as in Elland Park Wood, but in more or less interrupted patches towards the far end of the wood.

In a paper of this general nature it is unnecessary to attempt to deal with the peculiarities or characteristics of each plant in however limited a degree. The remaining phanerogams are simply arranged under the kind of habitat they mostly favour and compete for, this being considered preferable either to their chronological order of appearance or their systematic sequence. With one or two exceptions the nomenclature of the London Catalogue, 9th ed., has been followed.

Occasionally a little difficulty is experienced in deciding into which division certain plants should be placed. In many cases their power of adapting themselves to varied conditions is very elastic, and such might with equal propriety be placed in several divisions.

The bank on the Hardcastle roadside and a yard or two into the wood, where the road scrapings have been cast, has been taken possession by a number of meadow, pasture, and waste ground plants :—

<i>Ranunculus acris.</i>	<i>Sonchus oleraceus.</i>
<i>Bursa Bursa-pastoris.</i>	<i>Veronica Chamædrys.</i>
<i>Cerastium triviale.</i>	<i>Veronica montana.</i>
<i>Stellaria media.</i>	<i>Digitalis purpurea.</i>
<i>Trifolium pratense.</i>	<i>Lamium album</i>
<i>Trifolium repens.</i>	(near Nursery End).
<i>Trifolium dubium.</i>	<i>Plantago major.</i>
<i>Vicia Cracca.</i>	<i>Plantago lanceolata.</i>
<i>Vicia sepium.</i>	<i>Chenopodium album.</i>
<i>Alchemilla vulgaris.</i>	<i>Rumex obtusifolius.</i>
<i>Conopodium denudatum.</i>	<i>Rumex Acetosa.</i>
<i>Anthriscus sylvestris.</i>	<i>Rumex Acetosella.</i>
<i>Bellis perennis.</i>	<i>Luzula campestris.</i>
<i>Achillea millefolium.</i>	<i>Alopecurus pratensis.</i>
<i>Tussilago Farfara.</i>	<i>Trisetum pratense.</i>
<i>Senecio vulgaris.</i>	<i>Dactylis glomerata.</i>
<i>Senecio Jacobæa.</i>	<i>Poa annua.</i>
<i>Crepis virens.</i>	<i>Lolium perenne.</i>
<i>Hypochæris radicata.</i>	<i>Agropyron repens.</i>
<i>Taraxacum officinale.</i>	

On dryish banks in the wood we meet with :—

<i>Fragaria vesca.</i>	<i>Rumex Acetosella.</i>
<i>Potentilla fragaristrum.</i>	<i>Luzula erecta.</i>
<i>Galium saxatile.</i>	<i>Luzula campestris.</i>
<i>Veronica officinalis.</i>	<i>Anthoxanthum odoratum.</i>
<i>Melanopyrum pratense.</i>	<i>Deschampsia flexuosa.</i>
<i>Teucrium Scorodonia.</i>	<i>Pteris aquilina.</i>

In moist, open places :—

<i>Ranunculus Ficaria.</i>	<i>Epilobium angustifolium.</i>
<i>Neckerea claviculata.</i>	<i>Scabiosa succisa.</i>
<i>Viola Riviniana.</i>	<i>Centaurea nigra.</i>
<i>Stellaria Holostea.</i>	<i>Hieracium boreale.</i>
<i>Hypericum pulchrum.</i>	<i>Hypochæris radicata.</i>
<i>Rubus fruticosus agg.</i>	<i>Veronica serpyllifolia.</i>
<i>Rubus corylifolius.</i>	<i>Galeopsis Tetrahit.</i>
<i>Rosa canina agg.</i>	

In moist, shaded places :—

<i>Lychnis dioica.</i>	<i>Asperula odorata.</i>
<i>Oxalis Acetosella.</i>	<i>Nepeta Glechoma.</i>
<i>Circæa lutetiana.</i>	<i>Mercurialis perennis.</i>
<i>Sanicula europæa.</i>	<i>Allium ursinum.</i>
<i>Galium Aperina.</i>	<i>Millium effusum.</i>

Very moist or wet places, open or shade :—

<i>Ranunculus repens.</i>	<i>Angelica sylvestris.</i>
<i>Cardamine amara.</i>	<i>Valeriana officinalis.</i>
<i>Cardamine flexuosa.</i>	<i>Carduus palustre.</i>
<i>Hypericum tetrapterum.</i>	<i>Crepis paludosa.</i>
<i>Geranium Robertianum.</i>	<i>Scrophularia nodosa.</i>
<i>Lotus uliginosus.</i>	<i>Luzula maxima.</i>
<i>Spiræa Ulmaria.</i>	<i>Deschampsia cæspitosa.</i>
<i>Chrysosplenium oppositifolium.</i>	<i>Equisetum sylvaticum.</i>
<i>Epilobium obscurum.</i>	<i>Athyrium Filix-fœmina</i>
<i>Epilobium hirsutum.</i>	and var. <i>ovatum.</i>

Medium places in respect to both moisture and openness and shade :—

<i>Anemone nemorosa.</i>	<i>Stachys sylvatica.</i>
<i>Ranunculus Ficaria.</i>	<i>Urtica dioica.</i>
<i>Arenaria trinerva.</i>	<i>Corylus Avellana.</i>
<i>Rubus idæus.</i>	<i>Salix Caprea.</i>
<i>Epilobium montanum.</i>	<i>Scilla festalis.</i>
<i>Heracleum Sphondylium.</i>	<i>Luzula vernalis.</i>
<i>Hedera Helix.</i>	<i>Holcus mollis.</i>
<i>Viburnum Opulus.</i>	<i>Holcus lanatus.</i>
<i>Lonicera Periclymeum.</i>	<i>Dactylis glomerata.</i>
<i>Solidago Virgaurea.</i>	<i>Poa pratensis.</i>
<i>Vaccinium Myrtillus.</i>	<i>Lastrea Filix-mass.</i>
<i>Calluna Erica.</i>	<i>Lastrea spinulosa.</i>
<i>Veronica montana.</i>	<i>Lastrea dilatata.</i>

Among the plants which grow near the footpaths in the opener places are :—

<i>Stellaria Holostea.</i>	<i>Agrostis vulgaris.</i>
<i>Bellis perennis.</i>	<i>Poa annua.</i>

Those which take possession of the sandhills referred to above are :—

<i>Ranunculus repens.</i>	<i>Urtica dioica.</i>
<i>Anthriscus sylvestris.</i>	<i>Rumex obtusifolius.</i>
<i>Tussilago Farfara.</i>	<i>Poa pratensis.</i>

Ivy makes no attempt at tree-climbing here. The absence of the following plants is noteworthy :—

<i>Geum urbanum.</i>	<i>Myosotis sylvatica.</i>
<i>Lamium Galeobdolon.</i>	<i>Solanum Dulcamara.</i>
<i>Lapsana communis.</i>	<i>Arrhenatherum avenaceum.</i>

MOSESSES.—The mosses which form extended beds about rotting stumps, on banks, partially buried rocks, etc., are:—

<i>Tetraphis pellucida.</i>	<i>Mnium hornum.</i>
<i>Dicranella heteromalla.</i>	<i>Plagiothecium Borrerianum.</i>

In addition to the wall and dry bank mosses already referred to the following are met with in the wood :—

In and about the watercourses :—

<i>Philonotis fontana.</i>	<i>Brachythecium rivulare.</i>
<i>Mnium punctatum.</i>	<i>Eurhynchium prælongum.</i>
<i>Mnium undulatum.</i>	<i>Plagiothecium denticulatum.</i>
<i>Pterygophyllum lucens.</i>	<i>Hypnum cuspidatum.</i>

On moist sandy banks :—

<i>Catherina undulata</i>	<i>Webera albicans.</i>
var. <i>minor.</i>	<i>Mnium rostratum.</i>
<i>Fissidens bryoides.</i>	<i>Brachythecium rutabulum</i>
<i>Fissidens adiantoides.</i>	(also rocks).
<i>Barbula rubella.</i>	<i>Amblystegium varium.</i>
<i>Barbula revoluta.</i>	

Burnt or limed places, road-scrapings, etc.:—

Fumaria hygrometrica.

In rock crevices :—

<i>Ditrichum homomallum.</i>	<i>Ptychomitrium polyphyllum.</i>
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HEPATICS.—Two of the commonest hepatics on the floor of the wood are :—

Lepidozia reptans and *Diplophyllum albicans.*

On the moist banks and in the nooks and chinks of the rocks are :—

<i>Kantia Trichomanis.</i>	<i>Cilioscypha polyanthus.</i>
<i>Kantia arguta.</i>	<i>Jungermania ventricosa.</i>
<i>Cephalozia bicuspidata.</i>	<i>Nardia hyalina.</i>
<i>Lophocolea bidentata.</i>	<i>Nardia scalaris.</i>
<i>Lophocolea cuspidata.</i>	<i>Marchantia polymorpha.</i>
<i>Lophocolea heterophylla.</i>	

Along the watercourses :—

<i>Scapania undulata.</i>	<i>Aneura multifida.</i>
<i>Pellia epiphylla.</i>	<i>Conocephalus conicus.</i>

LICHENS.—Lichens are not very plentiful in Pecket Wood ; they may have been once upon a time, but the place is weak in these plants at present. Species of *Cladonia* appear to be

holding their ground best ; they often overrun and choke beds of *Tetraphis pellucida*, *Lepidozia reptans*, and other mosses and hepatics. They are :—

Cladonia pyxidata, also
var. *fimbriata*.

Cladonia digitata and
var. *macilenta*.

Cladonia cornucopiodes.

In decaying moss are :—

Collema pulposum.

Lecidea sabuletorum.

Spreading among ling, etc. :—

Peltigera canina.

Peltigera rufescens.

On rocks, walls, etc. :—

Parmelia physodes.

Lecidea vernalis.

Parmelia saxatilis.

Lecidea contigua.

On dead bilberry stems :—

Leconora conizea.

On bark of elder, oak, birch (on the rugged cracks at base of trunk) :—

Leconora varia.

Parasitic on the thallus of *Lecidea contigua* :—

Verrucaria gemmifera.

FUNGI.—The fungus flora is a much more mysterious business than that of any other branch. One might search the place for a lifetime, and, if it remained damp and shady, meet with something fresh every season. On the other hand, some species may be seen in plenty one season and never met with again. The majority of fungi are of necessity migratory. Being dependent on organic matter for their existence they must go where the kind they want is. If their particular host or habitat ‘gives out’ in one place they must seek it in another. This they are enabled to do by aid of the enormous number of spores each one produces. *Onygena pilogena* managed to find an old felt hat and the rotting cloth hearthrug in Pecket Wood, and an old worsted stocking in a field corner at Barkisland, nine or ten miles away ; we have never seen it anywhere else, and only at these places in two seasons, 1894 and 1897, respectively.

The number of species of fungi found within this 35 acres of woodland is 281, in addition to eight or ten still undetermined, besides a few omitted found on the low side of the Hardcastle Road, practically 300.

We think it best to give a classified summary of the list, with the number of saprophytes and parasites in each section ; also the number found on each kind of habitat or host, rather than in specific detail.

CLASSIFIED SUMMARY.

			Hu.	W.	L.	H. S.	Tr.	Hb.
Gastromycetes	... 9	S. 9... P. 0... S. 88... *On rotten cloth	8	1	...	...	...	...
Agaricaceæ...	...90	P. 2... S. 13... P. 2... S. 5... P. 0... S. 7... P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	68	14	2	...	2	...
Polyporaceæ	...15	P. 2... S. 5... P. 0... S. 7... P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	9	3	1	...	2	...
Clavariaceæ...	... 5	P. 0... S. 7... P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	3	...	1	1	...	...
Thelephoraceæ	... 7	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	1	6	...	...	...	...
Tremellaceæ	... 5	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	5	...	...	...	...
Uredinaceæ...	...15	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Ustilagineæ...	... 3	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Onygenaceæ	... 1	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Elaphomycetaceæ...	... 1	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Pyrenomycetes	...22	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Discomycetes	...67	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Gymnoascaceæ	... 2	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Protomycetaceæ	... 1	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Phycomycetes	... 2	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Deuteromycetes	... 7	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Hyphomycetes	...20	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...
Myxomycetes	... 9	P. 0... S. 5... P. 0... S. 0... P. 15... S. 0... P. 3... S. 1... On old felt	...	...	...	...	...	...

* The rotten cloth was belonging to a cast-out hearthrug, thrown into a damp corner of the wood. Nineteen species developed upon it. These may be dealt with in detail at some future time.

EXPLANATION OF SYMBOLS.—Hu. = On the ground in humus among grass, leaves, twigs, moss, soil, etc. W. = On dead stumps, trunks, branches, and twigs. L. = On dead leaves. H.S. = On dead herbaceous stems, leaves, etc. Tr. = Trees. Hb. = Herbaceous plants. S. = Saprophyte. P. = Parasite.

The total flora of this wood so far detected consists of 517 species, belonging to the following groups:—

	Phanerogams	...	...	141	
	Vascular cryptogams	...	8	{ Ferns 7 Equisetum 1	
Cellular Cryptogams.	{ Mosses	...	...	55	
	{ Hepatics	...	...	18	
	{ Lichens	...	...	14	
	{ Fungi...	...	...	281	

The members of the Union who attend the Hebden Bridge Excursion this month will have an opportunity of examining this very ordinary wood. They will, however, see it at a slight disadvantage on account of last year's fall of timber, and consequent disturbing of the normal condition of the ground.

FLOWERING PLANTS.

***Carum segetum* in North-west Lincolnshire.**—Going to Howsham on the 3rd of April, I noticed with pleasure several plants of *Carum segetum* in its old locality on the boulder clay bank just as you enter the village. I feared, as there was only one plant last season, we were going to lose it. As I returned home I found another locality for this species a mile away on the same rock-soil. It is only my second in 13 years.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 7th April 1904.

***Cardamine Amara*, Linn., in Lincolnshire.**—This species, which is recorded for every county and vice-county surrounding Lincolnshire, and for Rutland (Miss H. A. Trollope) as well as for Leicestershire, has at last turned up again on river gravel and freshwater alluvium with us. Miss J. Maud Tryon, writing 11th May 1904, from The Lodge, Oakham, with specimens, says—‘I found it in Lincolnshire this afternoon just above Newstead Mill. There is a good deal of it, but it is not yet quite in flower. It does not grow in the mill stream, but in the two backwaters.’ Newstead Mill is between Stamford and Uffington, well in the county of Lincoln. This is not the late G. W. Browning's, 1838, locality. It was ‘at Stamford, by the side of the Willand, near the waterfall.’—E. A. WOODRUFFE PEACOCK, Cadney, Brigg.

SEED COLLECTING AND DRYING.

REV. E. A. WOODRUFFE PEACOCK, F.L.S., F.G.S.,

Cadney Vicarage, Brigg.

FEW workers at our flora have made this branch of the subject a special study, so a few notes on one or two most important points concerning seed collecting and preparing may not be out of place in 'The Naturalist.'

Mature seeds are the objects of the student's quest, such as would most certainly grow, if planted in a fitting soil. Maturity, however, is a relative term, and it is not wise to reject the seeds even of the commonest species, because they are not ready to fall fully ripe from the receptacle at a touch. Even when species are found blooming in every pasture and meadow, hedge bank, and roadside waste, it does not necessarily follow that their seeds are easily obtained in a first-rate condition for a collection. *Ranunculus bulbosus* is a common enough species and a free seeder, but it will require no little care to get the seeds just in the right state for drying, so that they can be distinguished at a glance from their next neighbours, *R. sardous* (or *R. hirsutus*) in a series. To make absolutely certain both species have to be obtained in two series, (1) free, and (2) still attached to the receptacles. A species, too, may be so off-type that it can only be identified by its seeds, as was the case with a specimen of *R. parviflorus* from near Grimsby, shown me by Mr. A. Smith, F.L.S.

These are small matters, however, where big ones come. *R. Ficaria* is a reputation spoiler, if you want an exacting species. It is one of the most puzzling nuts for evolutionists of the Grant Allen school to crack. Assuming as they do, for the sake of their argument that the size and colour of flowers have been developed by insect visitors, here is a strikingly conspicuous species, which insects have practically ceased to visit, remarkable though it is in the spring dearth of flowers for size and colour. It is a more widely dispersed species than *R. bulbosus*, but what a contrast. Ten thousand receptacles may not yield a single seed! When you do find one or two watch them continually or your collection will never have specimens. In ten years I have succeeded in adding ten fairly matured seeds of *R. Ficaria* to my collection.

Cardamine pratensis is still unrepresented in my tubes. It, too, flaunts a flower-head in the May breezes, well nigh as conspicuous as *R. Ficaria*, but it is not so frequently found, and is still more particular about the localities in which it will fully mature its seeds. With all their gaudy show of blossom both species have found a simpler way under most circumstances of producing fresh plants than from matured seed.

So first 'catch' your seed! After that all is plain sailing. Reject nothing till by comparison the freshly gathered and dried ones are proved to be better specimens than those your tubes already contain. For collecting work in the field the simplest means in the end will be found best. There are all kinds of ways of folding seed papers, but the half-sheet of notepaper folded three times with the ends closed down is hard to beat. It is so simple and handy. Write on the outside in pencil the London Catalogue name and number of the species as soon as you have collected the seed in the field. When you have returned home, go over the name and number in ink, and place the packet just as it comes in from the field in a tray to dry in the ordinary temperature of a sitting room, not in artificial heat or the seeds will dry too rapidly. There is much surplus moisture in all seeds, and unless this is dried out before they are placed in the tubes of the collection, the seeds will most certainly mould, and lose their brightness, if they do not stick together in a most unpleasing mass.

The tubes I have found best for all kinds of seeds I obtained from Messrs. Reynolds & Branson, Leeds. They are two inches long, and half an inch across the mouth. When the seeds are quite dry they will 'jump' briskly when dropped on an oaken table from the height of a foot. Round seed when put on an inclined tray will soon sort themselves out from any dust or dirt or fractured capsules by gravity. Flat seeds must be placed in a tray and gently or more roughly blown according to their weight. If a few of the lighter seeds are blown away the sample finally obtained is all the more valuable.

Labelling is the next most important matter. Never gum a label on the outside of the tube. It may rub off, and in any case with handling becomes dirty. There is a far better way than adding anything externally. A tube with a half inch mouth, according to the thickness of the glass, which varies much even in the same order, will allow of a paper round the inside from $1\frac{1}{4}$ to $1\frac{3}{8}$ long, by half an inch wide, being used. This should be neatly cut, and the name and number written on

it, and placed half way down the tube and well pressed to the inside wall before the seeds are added. If this is done carefully no seeds will get between the paper and the glass.

A plug of white cotton wool finishes off the tube nicely. It admits the air to keep the seeds fresh and bright, but excludes all dust, bacteria, and spores of fungi.

Do not be content with your collection till you have three to five tubes of each species, taken on different soils under varying circumstances. The seeds of the same species are not exactly, only approximately, alike.

If the seeds are kept dry in the temperature of an ordinary sitting-room, say from 55 deg. to 62 deg. Fahrenheit, they will remain perfect for identification purposes for years. Nearly all will lose their vitality, though there are notable exceptions to this rule, but they will retain their size and characteristics practically for ever. Even seeds which have germinated slightly before being dried will keep their unnatural size and 'swollen appearance,' and can easily be detected from typically-matured ones of the same species.

Till the tubes accumulate by hundreds, and a case of drawers is bought for them, shallow cardboard boxes which will hold three rows of 15 tubes each, will be found amply sufficient for convenience in reference.

FLOWERING PLANTS.

Lincolnshire Botany.—At the meeting of the Lincolnshire Naturalists' Union at Barton-on-Humber, on the 20th of May, *Alopecurus bulbosus* was found on the estuarine alluvium covered by high spring tides, along with *Triglochin maritimum*, *Apium graveolens*, and *Plantago coronopus*, etc. The Middle Chalk in the quarries at Barton and South Ferriby was rich in aliens, such as *Aquilegia vulgaris*, *Hesperis matronalis*, *Ribes grossularia*, *Vinca major*, most of our common trees and *Cytisus Laburnum* and *Pyrus mitis*. This wealth of strangers on a new soil throws doubt on *Lactuca muralis*, which was the only good native species taken. The only plant of *Barbarea vulgaris* seen was in Barton Quarry. It was much frequented by *Helix cantiana*. This species was also not unfrequent on the roadside above the quarries on *Urtica dioica*. *H. cantiana* is not found the whole length of the chalk as it is along the Lincolnshire Limestone.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 25th May 1904.

YORKSHIRE NATURALISTS AT HARWOOD DALE,

21st-23rd MAY.

DURING a spell of glorious weather, which terminated immediately on the conclusion of the official programme, the members of the Yorkshire Naturalists' Union held a three days' excursion in the vicinity of Harwood Dale, about seven miles north-west of Scarborough. Over forty members were present, the greater number staying the week end. The excursions were so arranged as to cover as much of the area as possible, and examine it under its various aspects. The particular routes are referred to below, as well as the localities in which some of the more interesting finds were made. Notwithstanding the existence

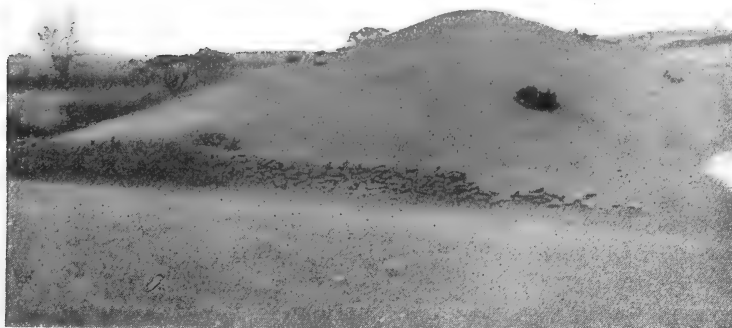


Photo by]

Glacial Mound near Lindhead Barn.

[J. J. Burton.

of a successful society in the neighbourhood, which has been at work for some years, it was found that many points of interest occurred which had not previously been noted. In this way the value of the Union was demonstrated; the numerous specialists present pointing out many lines of research to the members of the Scarborough Society, which will no doubt be followed up; whilst on the other hand the local Field Club rendered signal service to the Union by the excellent way in which its members acted as guides.

Southern Cleveland, in fine spring weather, with the vegetation yet untinged with the effects of a season's smoke, and its bright green colours relieved here and there by a profusion of

blossom, was an ideal place for the Union's first excursion for the year. The heather moorlands, the sheltered valleys, steep and wooded gorges, limestone quarries, and undulating glacial hills yielded the necessary variety of conditions to enable the various sections to carry on their work. The field of operations was reached each day by wagonettes, which brought the party home after the day's work; and in addition to the pleasure of seeing the country, these drives proved useful in enabling the members to take a broad general view of the aspect of the area which they were later to subject to detailed examination.

A pleasing feature of the Saturday's excursion was the opportunity the members had of examining the model farm, greenhouses, and grounds belonging to Mr. John E. Ellis, M.P., under his guidance. Mr. and Mrs. Ellis also kindly entertained the members to tea at Wrea Head. Not only was this part of the programme as instructive as it was pleasant, but it enabled the botanists to put on record the occurrence of a very interesting plant.

Probably the principal interest of the excursion attached to the geological section; the area under investigation being within that which has so recently yielded up its interesting history by the researches of Mr. P. F. Kendall.* Mr. Kendall himself led the party, and from various points of vantage described the effect of the Glacial Period upon the county.

On Saturday evening the members met at the Albemarle Hotel under the presidency of Mr. A. H. Pawson, F.L.S. Mr. Kendall gave a description of the local geological problems to be solved, and pointed out the way in which good work might be done in that particular field. A paper by the Rev. W. C. Hey, M.A., describing some recent exposures in the oolites and drift of East and West Ayton was read by the Secretary. A lengthy and instructive discussion followed having particular reference to botanical survey.

On Monday evening the general meeting was held at the same place, the President in the chair. Seventeen societies were represented. Reports on the work accomplished on the excursion were given by Messrs. K. MacLean, T. Petch, B.Sc., B.A., H. Ostheide, G. T. Porritt, F.L.S., T. W. Woodhead, F.L.S., W. Ingham, B.A., C. Crossland, F.L.S., and Mr. P. F. Kendall, F.G.S. Votes of thanks to the landowners, to the district secretary, and to the local guides were passed. Detailed reports have been supplied as follows:—

* See 'The Naturalist,' January 1903, pp. 14-16.

Mr. Kenneth MacLean, Secretary for Vertebrate Zoology, writes:—

It is no easy matter, especially in the neighbourhood of Scarborough on a fine Whit Monday, to get beyond the region of ginger beer bottles, orange peel, and sandwich papers, those inevitable signs of the excursionist. On the 23rd, however, we managed to get a quiet, uninterrupted ramble through a beautiful country.

In passing through the woods I came across an old tree bearing the marks of the Woodpecker's strong beak. Whilst examining these marks the old bird, in its beautiful green dress and red cap, darted with a wild laugh-like whistle from a hole higher up the tree; no doubt it had, or contemplated having, eggs at the bottom of the excavation.

A little further on I saw a pair of Carrion Crows showing signs of agitation and annoyance, and in a Larch tree I spied their nest. Whilst climbing up a young bird fluttered out on the branches, and on reaching the nest I found three more just ready to fly. In examining the nest I found a quantity of broken Snail shells, the contents of which had no doubt helped to produce the plump condition of the young Crows. As I was coming down the tree I thought to myself what useful members of society these Crows must be; but, alas, when I reached the bottom my thoughts were disturbed by the discovery of an egg shell, the contents of which had evidently followed or preceded the Snails down the young birds' throats.

The Wood Wren we found in abundance, its merry twitter was heard on every side. The Bullfinch seemed to be more plentiful than in most places.

A pair of Jays were in a state of great excitement, evidently considering me a dangerous character to be in the neighbourhood of their nest, which, however, I could not find.

The nest of the Golden-crested Wren, containing nine eggs, was also seen, tied under the end of a Spruce branch; and the Pied Flycatcher, a very interesting bird, was observed during the day.

Fifty-eight different kinds of birds were seen during the excursion. Fifty of these I saw myself, and others I got from a list kindly handed to me by Mr. M. GyngeU:—

Starling.	Jay.	Common Bunting.
Rook.	Jackdaw.	Bullfinch.
Carrion Crow.	Sky Lark.	Lesser Redpoll.
Magpie.	Yellow Bunting.	Linnet.

Chaffinch.	Great Tit.	Wheatear.
Sparrow.	Coal Tit.	Dipper.
Greenfinch.	Long-tailed Tit.	Blackbird.
Sand Martin.	Hedge Sparrow.	Song Thrush.
House Martin.	Sedge Warbler.	Missel Thrush.
Swallow.	Wood Wren.	Swift.
Pied Flycatcher.	Chiffchaff.	Green Woodpecker.
Tree Pipit.	Willow Wren.	Cuckoo.
Meadow Pipit.	Golden-crested Wren.	Herring Gull.
Yellow Wagtail.	Blackcap.	Sandpiper.
Grey Wagtail.	Whitethroat.	Lapwing.
Pied Wagtail.	Lesser Whitethroat.	Waterhen.
Wren.	Redbreast.	Land Rail.
Tree Creeper.	Redstart.	Partridge.
Blue Tit.	Whinchat.	Pheasant.
Marsh Tit.		

Mammalia noted on the excursion :—

Field Vole.	Water Vole.	Mole.	Weasel.
Squirrel.	Hare.	Rabbit.	

Amphibia noted :—Frog.

Fish noted :—

Common Trout.	Bullhead.	Minnow.
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**Petromyzon branchialis* (Small Lamprey).

For conchology Mr. T. Petch writes :—

The advisability of keeping in touch with more rapid workers interfered to some extent with the researches of the conchological section. On the first day the Rev. E. P. Blackburn supervised the examination of a small area in Harwood Dale, near the Mill Inn; the second was spent with Mr. Hargreaves in the ravine on Cloughton Moor, Oxdale, and the moraines above Lindhead Barn, and Messrs. W. Denison Roebuck and J. E. Crowther investigated Breaday Gill and Lowdale on the third.

As *Helix Lamellata* had previously been found in several localities near Scarborough on *Luzula*, much attention was given to the mosses of this plant which form such a prominent feature of the district, but probably owing to the dry weather our search was unsuccessful. One specimen of *H. aculeata* and several *H. nemoralis* were taken on this plant in Harwood Dale. *H. hortensis* was more common, occurring in Harwood Dale, Cloughton Moor, Lindhead Barn, Silpho Moor, Breaday Gill, and Hackness. *H. rotundata* and *H. hispida* were abundant. *H. rufescens* was common near the mere at Hackness, but was not seen elsewhere, and a few specimens of *H. cuperata* were taken on the slope of Harwood Dale and above Lindhead Barn.

* Some boys had killed several of these and called them Trout blood-suckers.

Notable omissions are *H. virgata* and *H. pulchella*. Seven species of *Hyalinia* were observed:—*Hy. cellaria*, Harwood Dale and Breaday Gill; *Hy. alliaria* and *Hy. crystallina*, Harwood Dale, Cloughton Moor, Breaday Gill, Hackness, Lindhead Barn; *Hy. fulva*, common everywhere; *Hy. pura*, Harwood Dale and Breaday Gill, fairly common; *Hy. nitida* and *Hy. nitidula*, Breaday Gill, not common. Dead shells of *Vitrina pellucida* were found in all these localities. *Cochlicopa lubrica* was generally distributed. *Carychium minimum* occurred sparingly in Harwood Dale and the Cloughton Moor ravine, and *Balea perversa* was abundant under the flat stones on the top of a moorland wall at the head of Breaday Gill. This species lives in a similar situation in Forge Valley; in fact, such appears to be its normal habitat in the Scarborough district. It is most numerous—in clusters of a dozen or more—where the wall is overhung by trees, this position probably affording more moisture and favouring the growth of mosses, though *Balea* is not, as far as I have seen, taken amongst moss nor on the most thickly-covered stones. *Pupa cylindracea* was found with *Balea* and also in Harwood Dale and on the moraines above Lindhead Barn. A dead specimen of *Clausilia laminata* was found on a wall in Harwood Dale, and one alive at Hackness on Ash branches with one *Buliminus obscurus* and an abundance of *Clausilia perversa*. One specimen of *Vertigo edentula* was taken on Cloughton Moor.

Slugs were exceptionally numerous, *Arion hortensis*, *A. circumscriptus*, *A. minimus*, *A. ater*, *Limax agrestis*, *L. levis* occurring everywhere, the first two together even in the wildest parts; *Limax maximus* was found in Breaday Gill, *L. arborum* at Breaday Gill and Cloughton Moor, *Arion subfuscus* in Harwood Dale and Breaday Gill, and *Limax cinereo-niger* in the Cloughton Moor ravine, Breaday Gill, and on the escarpment near Silpho Brow. Several specimens of *Succinea putris* were swept by the coleopterists near Lowdales.

There were few opportunities of finding freshwater species. *Velletia lacustris* was very abundant in a pond near the Mill Inn, in striking contrast to its extreme rarity in known localities near Scarborough and in East Yorkshire generally. Twenty-four were counted on one small branch and another larger harboured over fifty. *Pisidium pusillum* was taken in the same pond. *Ancylus fluviatilis* was found in small streams near the Mill Inn and above Lindhead Barn, but apparently does not occur in the larger streams, Lownorth Beck, Lowdales Beck,

Lindhead Beck. It would be interesting to know how far this observation is correct, and, if correct, what is the determining factor, e.g., velocity, depth, temperature, or relative purity of water, and the presence or absence of algæ.

Both species and individuals were more numerous in the valleys above Hackness than on the drift near Lindhead Barn, and the latter again was more productive than the Cloughton Moor ravine and Oxdale. Such variation in distribution has yet to be explained, and there appears to be an opportunity in a district which presents so strongly marked differences of soil and vegetation of acquiring facts which will enable other workers to form definite conclusions.

Mr. G. T. Porritt, F.L.S., F.E.S., reported that the only lepidopteron worthy of note taken was the larva of *Plusia interragationis*, though a number of common species were also observed.

Mr. M. L. Thompson reports that, besides himself, the coleopterists present were Messrs. H. Ostheide and W. Pearson. After working over the moor for some time, a descent was made by the adjoining gill into Whisperdale. Traversing this beautiful valley Hackness was reached later in the afternoon. The following beetles were met with along the route :—

Carabus violaceus L.
Carabus arvensis F.
Nebria brevicollis F.
Loricera pilicornis F.
Pterostichus nigrata F.
Cercyon hæmorrhoidalis Herbst.
Cercyon melanocephalus L.
Aleochara lanuginosa Grav.
Tachyporus hypnorum F.
Ocypus morio Grav.
Philonthus splendens F.
Philonthus decorus Grav.
Anthobium torquatum Marsh.
Necrophorus mortuorum F.
Silpha rugosa L.
Coccinella 7-punctata L.
Brachypterus urticae F.
Epuraea æstiva L.
Meligethes æneus L.
Rhizophagus dispar Gyll.
Lathridius lardarius DeGeer.
Coninomus nodifer Westw.
Micrambe vini Panz.
Aphodius punctato-sulcatus Stm.
Aphodius luridus F.

Geotrupes stercorarius L.
Geotrupes sylvaticus Panz.
Athous hæmorrhoidalis F.
Adrastus limabatus F.
Agriotes pallidulus Ill.
Helodes marginata F.
Rhagonycha pallida F.
Cis boleti Scop.
Clytus arietis L.
Rhagium bifasciatum F.
Chrysomela polita L.
Plectroscelis concinna Marsh.
Anaspis frontalis L.
Deporaus betulae L.
Apion ulicis Forst.
Otiorrhynchus picipes F.
Polydrusus cervinus L.
Phyllobius calcaratus F.
Phyllobius pyri L.
Phyllobius argentatus L.
Barynotus elevatus Marsh.
Anoplus plantaris Naez.
Cæliodes rubicundus Herbst.
Cæliodes quadrimaculatus L.
Ceuthorrhynchus contractus Marsh.

FLOWERING PLANTS.—Dr. William G. Smith reports that the selection of Scarborough as the centre for a Whitsuntide excursion was a happy one. At few other seasons could there be a finer display of tree colour than we have had these past few days on the well-wooded slopes of Harwood Dale and the Upper Derwent. Apart from the æsthetic, the colouring showed at once the chief trees which make up the various plantations, and it was not hard to appreciate that forestry is undertaken in earnest by the landowners. The ground vegetation of the woods contributed more than the open pastures and moors at this season. There was ample variety of spring flowers for the beginner to do much profitable observation, while the masses of Bluebell, unfolding Fern, and Dog's Mercury, dotted with Primroses and Wood Sorrel, raised many a conjecture as to cause. Interesting plants like the Bird Nest Orchid (*Neottia*), and the parasitic Toothwort (*Lathræa*) were also found. The plants flowering in the open pasture were only the forerunners. In the oolitic pastures especially was there promise of a fine variety of species later on. The Moonwort Fern and the Adder's Tongue, both fairly abundant were found unfolding their shoots. The moors were the domain of 'glacial men,' and as they rushed from moraine to valley and up again to the moor-top, the botanist had scant opportunity for examining the vegetation of the numerous valleys and ravines. *Sphagnum* bogs were numerous, as one found on sinking into them. The most interesting feature of these was the scrub of Sweet Gale (*Myrica*) which occurred in several of the valleys, notably in Jugger Howe; this plant is much more frequent in the moister West than in the drier East of Britain. On the drier tracts of Ling, could be seen patches of golden Needle Furze (*Genista anglica*), while seedlings of Birch, Willow, and Mountain Ash were frequent almost up to the moor-top. The most interesting plant of the moor was the Lesser Tway-blade (*Listera cordata*), found by a working party of botanists, who carefully examined one area. The display of Gorse on the dry slopes attracted much attention, and its distribution as compared with the Bracken formed a topic at the evening discussions. The visit was too short, but sufficed to show that the district includes much of interest to the botanist, not only inland but along the coast, which the Y.N.U. for the present did not attempt.

On each excursion the botanists were very ably led by Miss Simpson, the energetic Secretary of the Scarborough Naturalists' Society.

MOSESSES AND HEPATICS.—Mr. Wm. Ingham, B.A., writes :—The richest ground traversed for these plants was Breaday Gill, but far too little time was given to it to disclose all the moss treasures that I think will be found there. The most interesting plant found here is *Cephalozia curvifolia*, one of the most beautiful of the liverworts or hepatics. This is a rare plant, known for some time as growing by the Lakes of Killarney, in Naddle Forest, Westmorland, and in several places in Scotland. Another rare hepatic here is *Cephalozia lunulæfolia*. The dominant mosses of the district are *Ceratodon purpureus*, *Hypnum cupressiforme*, *Mnium hornum*, *Dicranum scoparium*, *D. majus*, and *Hylocomium triquetrum*, *H. splendens*, *H. squarrosus*, the last three (members of the same genus) occurring in association on the grassy banks descending into Harwood Dale, the first named being the dominant partner. This association among the mosses may be compared with the association of *Lastræa dilatata*, *Luzula sylvatica*, and *Pteris aquilina* among the higher plants observed in the Oak wood on the top of the moor. Appended is a list of the plants observed.

I.—HEPATICS OR LIVERWORTS.

<i>Lepidozia reptans</i> (L.).	<i>Lophocolea bidentata</i> (L.).
<i>Kantia trichomanis</i> (L.).	<i>Lophocolea heterophylla</i> (Schrad.).
<i>Cephalozia lunulæfolia</i> Dum.	<i>Plagiochila asplenoides</i> (L.).
<i>Cephalozia bicuspidata</i> (L.).	<i>Jungermania inflata</i> Huds.
<i>Cephalozia curvifolia</i> (Dicks.).	<i>Pellia epiphylla</i> (L.).
<i>Scapania undulata</i> (L.).	<i>Metzgeria pubescens</i> (Schränk.).
<i>Diplophyllum albicans</i> (L.).	<i>Conocephalus conicus</i> L.

Of the above *Diplophyllum albicans* is the dominant one, being abundant on banks and ditch sides everywhere.

II.—SPHAGNA OR PEAT MOSESSES.

<i>Sphagnum acutifolium</i> Russ. & Warnst.	<i>Sphagnum recurvum</i> Russ. & Warnst.
Var. <i>flavo-rubellum</i> and var. <i>viride</i> .	<i>Sphagnum molluscum</i> Bruch.
<i>Sphagnum cuspidatum</i> Russ. & Warnst.	<i>Sphagnum compactum</i> DC.
Var. <i>submersum</i> Schimp.	<i>Sphagnum papillosum</i> Lindb.

Of these peat mosses *Sphagnum recurvum* is the most abundant and most widely spread, and *S. compactum* comes next in frequency.

III.—MOSESSES (MUSCI VERI).

<i>Tetraphis pellucida</i> Hedw.	<i>Dicranella squarrosa</i> Schimp.
<i>Polytrichum aloides</i> Hedw.	<i>Campylopus flexuosus</i> Brid.
<i>Polytrichum juniperinum</i> Willd.	<i>Dicranum Bonjeani</i> DeNot.
<i>Polytrichum commune</i> L.	<i>Dicranum Scoparium</i> Hedw.
<i>Ceratodon purpureus</i> Brid.	<i>Dicranum majus</i> Turn.
<i>Dicranella heteromalla</i> Schimp.	<i>Leucobryum glaucum</i> Schimp.

- Fissidens bryoides* Hedw.
Fissidens taxifolius Hedw.
Tortula muralis Hedw.
Tortula subulata Hedw.
Tortula intermedia Berk.
Tortula ruralis Ehrb.
Barbula rubella Mill.
Barbula fallax Hedw.
Weisia viridula Hedw.
Weisia tenuis C.M. c.fr.
Uloa, species not yet determined.
Orthotrichum, " "
Funaria hygrometrica Sibth.
Aulacomnium palustre Schwgv.
Philonotis fontana Brid. c.fr.
Webera nutans Hedw.
Webera carnea Schimp.
Webera albicans Schimp.
Bryum pallens Sw.
Bryum bimum Schreb.
Bryum pseudo-triquetrum Schwgv.
Bryum caespiticium L.
Bryum capillare L.
Mnium undulatum L. c.fr.
Mnium hornum L.
Mnium punctatum L.
Neckera complanata Hübner.
Anomodon viticulosus H. & T.
Thuidium tamariscinum B. & S.
Climacium dendroides W. et M.
Pleuropus sericeus Dixon.
- Brachythecium rutabulum* B. & S.
 and var. *robustum*.
Brachythecium rivulare B. & S.
Brachythecium velutinum B. & S.
Brachythecium purum Dixon.
Eurhynchium prælongum B. & S.
Eurhynchium Swartzii Hobk.
Eurhynchium myosuroides Schimp.
Eurhynchium rusciforme Milde.
Eurhynchium murale Milde.
Eurhynchium confertum Milde.
Plagiothecium denticulatum B. & S.
Plagiothecium undulatum B. & S.
Amblystegium serpens B. & S.
Amblystegium filicinum DeNot.
Hypnum riparium L. c.fr.
Hypnum stellatum Schreb.
Hypnum fluitans L.
 var. *Jeanbernatii* Ren. c.fr.
Hypnum commutatum Hedw.
Hypnum cupressiforme L.
 var. *ericetorum* B. & S. and
 var. *filiforme* Brid.
Hypnum molluscum Hedw.
Hypnum palustre L.
Hypnum cuspidatum L.
Hypnum Schreberi Willd.
Hylocomium splendens B. & S.
Hylocomium squarrosum B. & S.
Hylocomium triquetrum B. & S.

In addition to the above an important peat moss and two of the true mosses need further study before the names are published.

Mr. C. Crossland, F.L.S., writes:—

FUNGI.—The work of collecting fungi was comparatively light. In May the majority of these plants are out of season, and no great baskets are needed in which to carry those to be met with at this time of the year. In August and September there would be no difficulty in finding 'heaps of stuff' in the valleys and woods visited. There is, however, something to be found the year round by searching. Increased interest is being taken in this branch of botany; several members brought in specimens. Perhaps the best thing met with was *Helvella macropas*.

The list being short it is given in full, though several are common species to be found almost anywhere.

- Collybia clusilis*. Among moss in swamp.
Omphalia sphagnicola. On *Sphagnum*.
Pholiota mutabilis. On dead stump.
Pholiota præcox. On the ground.
Pholiota mycenoides. On moss.
Coprinus plicatilis. On the ground among grass.
Polyporus squamosus. On stump.
Poria medulla-panis. On dead branch.
Puccinia hieracii. On *Carduus lanceolatus* and *C. arvensis*.
Puccinia violæ. *Æcidium* on *Viola*.
Puccinia carices. *Æcidium* on Nettles.
Phragmidium subcorticatum. On *Rosa*.
Uromyces poa. On *Ranunculus repens*.
Helvella macropus. On the ground.
Vibrissia truncorum. On rotten branch in water.
Dasyscypha calycina. On Larch (the Larch disease).
Dasyscypha virginia. On dead herbaceous stem.
Mollisia cinerea. On dead wood.
Mollisia juncina. On dead *Juncus* stems.
Exoascus turgidus. On Birch; the fungus which is the cause of the abnormal formations known as witches' brooms.
Egeria candida. On rotten wood.
Lycogala epidendrons. On rotten wood.
Didymium effusum. On wood.
Stemonitis Friesiana. On wood.

T. S.

FLOWERING PLANTS.

The Henbane.—With regard to Mr. Peacock's note on this subject in the April 'Naturalist': as I have never worked at botany systematically, it is quite possible that the Henbane may occur in many East Riding localities where I have not seen it. The nature of the spot where I saw it at Flamborough quite agrees with Mr. Peacock's observations. A slip had occurred in the glacial beds that overlie the chalk cliffs near Danes' Dyke, and it was on the fresh soil thus exposed that a huge plant of Henbane was growing. It would be interesting to learn how the seed-habit of the Henbane has been acquired, and what advantage the plant gains by it.—W. C. HEY, West Ayton.

Plants in Cumberland, 1707.—The new volume of the 'Transactions of the Cumb. and Westm. Antiq. and Archæol. Society,' Vol. 4, N.S., 1904, contains a few more early records (ante 1901, May; 1902, June; 1903, May and July). Bishop Nicolson writes in his diary, 1707—'July 18. Mr. B. and Cousin Chambers accompanied me . . . to Cardornock; a place I had long desired to see, looking for a variety of plants. None did I meet with but (what are common on all our coasts) the *Coronopus* (= *Plantago maritima* L.), *Cariophyllus Marinus* (= *Armeria maritima* Willd.), and the Behen album (= *Silene cucubalus* Wib.).' The locality is near Bowness-on-Solway.—S. L. PETTY, Ulverston, April 1904.

Naturalist.

REVIEWS AND BOOK NOTICES.

A TEXT BOOK OF GEOLOGY.

A familiar text book to geological students for some years past is that written by Mr. W. Jerome Harrison, of Birmingham. That a fifth edition of this has appeared is sufficient evidence of its popularity. The present issue is largely revised, and has the addition of several fine photographic illustrations, with which Yorkshire geologists will be familiar. The frontispiece, repre-



The Hemlock Stone, near Nottingham.

senting Scarborough Castle Rock, is particularly fine, and shows the various beds of which this once picturesque piece of our coast-line is composed. By the kindness of the publishers, Messrs. Blackie & Son, we reproduce herewith one of the illustrations, showing a large mass of weathered Keuper Sandstone near Nottingham.

'The Classification of Flowering Plants.' By A. B. Rendle, M.A., D.Sc. Vol. I. *Gymnosperms and Monocotyledons*. Demy 8vo., pp. xiv. + 332. 10s. 6d. University Press, Cambridge.

Students of Botany who have been using Coulter and Chamberlain's 'Morphology of Angiosperms' will have felt keenly the need of a reliable work dealing in more detail with the classification of these plants. Such is now available in this volume by Dr. Rendle. Few botanists in this country were so well fitted for the task, and he has accomplished it with great skill and sound judgment. The system adopted is that of Engler's 'Syllabus der Pflanzenfamilien,' and there is a short historical introduction in which the systems of the older botanists are outlined in an able and interesting manner. With each order the more important structural and biological features are given, and the concluding chapter is a general review of the Monocotyledons, in which the affinities of the groups are considered. We wish these features of the work had been more fully treated. It is a pity the 'means available did not allow of the preparation' of better figures; in this respect the book compares unfavourably with the American work. We shall look forward with eagerness for Volume II., which will deal with the Dicotyledons.



'A Manual and Dictionary of the Flowering Plants and Ferns.' By J. C. Willis, M.A., Second Edition, Crown 8vo., pp. xii. + 670. 10s. 6d. University Press, Cambridge.

The first edition of this valuable manual was in two volumes, which the author thinks was a mistake, and now a second edition appears in one volume. Part I. has been shortened by the omission of controversial matter, and the use of small type for paragraphs of descriptive terms and other articles not intended for consecutive reading. In this way the volume is brought down to a handy size, still many who have been regularly using Part II. of the first edition will not find the present volume quite so convenient for the pocket. A large mass of new material has been added to Part I., while Part II. has been revised and considerable portions rewritten. The concise manner in which the book is written, together with a great deal of cross reference, has enabled the author to bring together an amount of material which renders the work a veritable encyclopedia. It is indispensable to all botanists, as no work in existence contains within so small a compass such a large number of important and reliable facts.



'A Holiday with Nature' is the title of a short paper by the Rev. T. Ainsworth Brode in 'Nature Study' for May. It principally deals with the botanical aspect of Acklam in July. In the same journal the Toothwort is recorded for High Hoyland (South-west Yorkshire).



The 'Eighth Quarterly Record of Additions to the Hull Museum' (Publication No. 19, one penny) has been published. It is principally devoted to descriptions and illustrations of antiquities, but of interest to our readers are 'Geological Discovery at Bridlington' and 'Some Local Newts.' Particulars of the School Children's Essay Competition are given, with specimen essays.



The 'Annual Report of the Yorkshire Philosophical Society,' for 1903, just to hand, is exceptionally large and interesting, due to the inclusion of a reprint (with plates) of Dr. Tempest Anderson's paper in the 'Geographical Journal' on 'Recent Volcanic Eruptions in the West Indies.' Mr. H. J. Wilkinson contributes Part X. of his 'Catalogue of British Plants in the Herbarium of the Yorkshire Philosophical Society (*Eupatorium cannabinum* to *Tragopogon porrifolius*),' which includes several interesting northern county specimens. The Rev. W. C. Hey contributes 'A Description of the Ground excavated in laying the water-mains at East and West Ayton, near Scarborough. A few additions to the Museum are recorded.

FIELD NOTES.

FISHES.

Fishes in Cumberland, 1708.—Bishop Nicolson in his diary for 1708 (Trans. Cumb. and Westm. Antiq. and Archæol. Soc., Vol. 4, N.S., 1904, p. 29) mentions he was in London on 3rd April. 'Char—Thence to Mr. Solicitor Montague with my thanks . . . and [he] will accept my help and another Charpye.' To this the editor (Bishop Ware) appends a note—'A list of letters appended to the diary gives on 22nd March 1707-8, 'Sir Ja. Montague with a pot of Chars; and thanks for all his favours.' Therefore 'Char pye' was the same thing which is now known as potted Char. On 14th May Nicolson notes 'A Sturgeon from Bowness,' i.e., Bowness-on-Solway, and on 16th June he went 'to see the fishing at Beaumont and Mr. Reed's coops: where Salmon sold at 22d., Gilse at 6d., and Esk-Trout at 3d. Strong east wind brought in the Herring, and sent the Salmon o'roving.'—S. L. PETTY, Ulverston, April 1904.

MOLLUSCS.

Lincolnshire Mollusca.—On 15th April, a lovely mild day, with gentle rain and south-west wind, my father and I visited the Thirty-foot bank, which is a mixture of arable peat and Oxford clay. On it we found *Helix nemoralis*, *H. arbustorum*, *H. cantiana*, *Arion ater* (young only), and *Agriolimax agrestis*, out feeding. One specimen of the first species was a perfect *libellula*, 12345; it is not common here. The ordinary *nemoralis* of this rock-soil mixture is a light green *olivacea*, with uncertain banding.—DENNIS M. C. WOODRUFFE PEACOCK.

Shells at Hornsea Mere.—*Pisidium henslowianum*, *P. cinereum*, and *P. nitidum* have been identified by Mr. J. W. Taylor amongst material collected in Hornsea Mere on various occasions during the last ten years. Mr. C. Reid in 'Geology of Holderness' recorded the first of these and probably the second (*P. casertanum*); the third has not been previously recorded. The following also occur round the Mere but have not found a place in published lists:—*Arion circumscriptus*, *Hyalinia crystallina*, *Helix rotundata*, *Succinea elegans*.—T. PETCH, 16th April 1904.

NORTHERN NEWS.

Some Anglo-Saxon cinerary urns found at Newark some years ago are figured and described by Mr. T. Sheppard in the 'Antiquary' for May.

Our readers will be glad to learn that Mr. Harold Wager was elected a Fellow of the Royal Society at a meeting of that body held on 5th May.

The Bradford Scientific Association has issued an attractive 8 pp. pamphlet, giving particulars of the 'Summer Excursions and Visits to Works, 1904.'

The Corporation of Halifax has purchased the collection of birds formerly in the possession of the late Mr. J. Cunningham, curator of the Halifax Museum.

We are glad to hear that the Royal Society's grant has been renewed for this year towards a Botanical Survey of Somerset now being carried on by Mr. C. E. Moss, B.Sc.

Illustrations of a British cist, and a vase found inside it, recently excavated on the crest of Brandon Hill, Durham, appear in the 'Daily Graphic' for 22nd April.

The City of Leeds Education Committee held a geographical exhibition in the Pupil Teachers' College, Leeds, from 23rd April to 3rd May. The exhibition consisted of maps, models, globes, charts, etc., and the public were admitted free.

At the annual meeting of the Darlington and Teesdale Naturalists' Field Club, held recently, Councillor E. Wooler was elected president. This club, which was established 13 years ago by the late Dr. Manson, has a membership of 71.

In the April 'Journal of the Quekett Club' Mr. D. J. Scourfield gives Part III. of his 'Synopsis of the Known Species of British Freshwater Entomostraca.' This instalment includes the Ostracoda, Phyllopoda, and Branchiura, and includes several northern records.

Mr. Eli Sowerbutts, a familiar figure at the meetings of the British Association, and one of the founders of the Manchester Geographical Society, died on Saturday, 30th April. He was born in 1834. He was latterly in business in Manchester, and at one time was at Huddersfield.

At the recent annual meeting of the Leeds Co-operative Field Club it was reported that the Club's high position, educationally and financially, had been maintained. Forty-two meetings had been held during the year, and 18 lectures had been delivered. Mr. B. Holgate was re-elected President.

In the May number of the 'Geographical Journal' (pp. 660-671) is a valuable paper on the 'Peat Moors of the Pennines: their Age, Origin, and Utilisation, by C. E. Moss, B.Sc., being a paper read before Section E at the meeting of the British Association, Southport, 1903. The paper is illustrated by nine excellent photographs of moorland vegetation, taken by Mr. W. B. Crump, M.A. (Halifax), and there are three diagrams in the text.

We regret to record the death of Samuel H. Hudson, of Epworth, on the 7th of April. He was a fine example of the labouring-man naturalist; showing at once the widest sympathies with nature in the best sense, and the difficulty of working without books and a proper training. He was over 77 years of age, and so was a youth before the advent of village schools, with no education except what his own industry and native talent had striven for. A natural gift for quick and minute observation was highly developed in him. He either added or proved the following species to be still integers of the Lincolnshire flora:—*Thalictrum collinum*, *Erodium moschatum*, *Andromeda Polifolia*, *Setaria verticillata*, and *Phegopteris Dryopteris*. He was the last worker who took *Nisionades semiargus*.

Naturalist,

7 JUN. 1904

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THE NATURALIST

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MUSEUM, HULL;

TECHNICAL COLLEGE, HUDDERSFIELD;

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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CAPITALISATION OF SPECIFIC NAMES.—Hitherto the rule of *The Naturalist* has been the Zoological one, that specific names shall invariably commence with a small letter, never with capitals. Henceforth this rule will still apply to all Zoological names, but in deference to the wishes of our botanical contributors the specific names of plants will conform in this respect to the standard catalogue or monograph in each branch of botany.

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All communications to be addressed to the Hon. Sec.,

T. SHEPPARD, F.G.S., Museum, Hull.

PUBLICATIONS RECEIVED.

Animal Life, Zoologist, Le Mois Scientifique, for May; New Phytologist, April and May; Knowledge and Scientific News, Entomologist, Nature Notes, Irish Naturalist, and Nature Study, for June; Bradford Botanical Garden, Descriptive Handbook to the Bed of Economic Plants, 1904; Trans. Entomological Society, 1904, Part I.; Revue Bryologique, 1904, Part 3; Trans. Wisconsin Academy, Vol. 13, Part 2, 1901; Lepidoptera of British Islands, Barrett, Vol. 9, 1904.

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LIST OF YORKSHIRE LEPIDOPTERA,

By G. T. PORRITT, F.L.S., F.E.S.,

Past-President of the Yorkshire Naturalists' Union, etc.

May be had from the Hon. Sec. Y.N.U., The Museum, Hull.

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NOTES AND COMMENTS.

GEOLOGICAL PEEPS.

In a paper contributed to the 'Annual Report of the Yorkshire Philosophical Society,' noticed elsewhere (p. 190), the Rev. W. C. Hey gives the following 'Pictures':—A PICTURE OF THE OOLITIC AGE.—Coral reefs are forming in a warm sea. Huge Phasianellæ and elegant Delphinulæ crawl upon the rocks; Oysters and Pectens and Limas form beds; now and again a big Ammonite drifts by. Exquisitely beautiful Sea-urchins abound, and the pools are enlivened by fishes and crustaceans. A PICTURE OF THE GREAT ICE AGE.—Millions of years have gone by. The chalk has been formed at the bottom of the sea and raised into the Wolds. The Tertiary period has come and gone and left no trace. Then the temperature lowers and eventually a huge glacier towering to the height of 400 feet pushes in between the chalk wolds and the oolitic hills, driving back the drainage of the district, and compelling it to force itself away into the Vale of York. This glacier advances as far as Wykeham. The hill which forms the park of Wykeham Abbey is its terminal moraine. The drainage from the north comes through Forge Valley and is deflected by the glacier sharply to the west, and deposits on the hill sides the gravels which the trench cuts as it rises up the slope by the Infant School at West Ayton.

A YORKSHIRE LIBRARY.

The citizens of Hull are to be congratulated on their acquisition, by purchase, of the library of the Yorkshire Naturalists' Union. Ever since the formation of the Union, books, periodicals, and pamphlets relating to the natural history and geology of the county have been placed in its library. In addition, most of the important scientific magazines and transactions of various learned societies have been purchased or received in exchange for the Union's publications. For some years the library has been housed in the Leeds Institute, but recently has grown beyond the control of an honorary librarian. In order that its usefulness might not be impaired, however, the Union decided to offer it to some permanent institution within the county. This was accepted by the Public Libraries Committee of the Hull Corporation. The books are now in Hull, and will shortly be available in the Central Reference Library to any who may wish to consult them.

RECORD YOUR PHOTOGRAPHS.

We have already referred in these columns to the excellent work being accomplished by the Geological Photographs Committee of the British Association, guided by its secretary, Prof. W. W. Watts. A third set of platinotype photographs, selected from the committee's most valuable series, has just been issued to subscribers, and exceeds in interest that of the two previous issues. In it are several old friends, which are therefore welcome. One of these is reproduced herewith, together with the description thereof by Mr. G. W. Lamplugh. These alone should convince photographers of the necessity of taking permanent record of objects of this character, and of the value attached to the prints if sent to the Geological Photographs Committee. It is to be hoped that the Geological Photographs Committee of the Yorkshire Naturalists' Union will materially assist the larger committee in its work during the coming year.

PLUVIAL DENUDATION IN YORKSHIRE.

The most remarkable physical feature of the Yorkshire Wolds is their ramifying system of streamless dales, floored with the gravels of bygone water-courses. Under present climatal conditions the ordinary rainfall is readily absorbed by the much-jointed chalk, and the drainage is almost entirely subterranean. But occasionally, when there is a rapid melting of thick snows while the subsoil is still frozen, or when rain falls so suddenly and so heavily that the soakage capacity of the land is overtaxed, the 'dry bones' of the dales are stirred by brief floods that assert their ancient right-of-way, and play havoc with the impediments which short-memored man has placed in their path. The photograph shows the effect of one of these exceptional happenings in a dale three-quarters of a mile west of Langtoft, an agricultural village in a wold valley, six miles north of Driffield. On 3rd July 1892 a torrential rain started cascades pouring suddenly down the slopes of the dale, ripping gullies through the chalk-rubble and shaken rock, and spreading a fan of detritus at the foot of the slope after the manner of rain-storms in arid mountain lands, but fortunately not very frequent in our country. The tempestuous flood then swept along the bottom of the dale and wrecked the low-lying parts of Langtoft, imperilling the lives of certain villagers and actually drowning some of their pigs. Four years previously, on 9th June 1888, there had been a similar though less destructive flood, by which the gullies shown in the photograph were

partly cut. I visited the scene a few days after this earlier flood and noticed that the torrents had gathered on the plateau mainly from a large bare tillage field recently sown with turnips where there was no impediment to surface-drainage, while the thickly-grown corn-crop of an adjacent field, on which the down-pour appeared to have been quite as great, had entangled the water and given time for its underground absorption. In the



Pluvial Denudation in Yorkshire.

same way, on impervious rocks the bare slopes drain quickly dry, while those covered with vegetation may remain sodden for weeks. The photograph, taken three days after the incident, shows a near view of two of the gullies, the greatest depth of which was about ten feet; another is just seen edgewise in the middle of the picture; and traces of erosion will also be noticed in the distant hollow.

MYCETOZOA.

Mycetozoa in the Scarborough District.—In addition to the species previously enumerated in 'The Naturalist' the following were found on the Whitsun excursion:—*Comatricha persoonii*, Cloughton Moor ravine, on holly leaves; *Didymium nigripes* and *Trichia persimilis*, Oxdale, and *Ceratiomyxa mucida*, *Trichia fallax*, *T. botrytis*, *T. varia*, all on wood in Breaday Gill.—T. PETCH, 8th June 1904.

1904 July 1.

YORKSHIRE NATURALISTS AT HEBDEN BRIDGE,

11th JUNE 1904.

TWENTY-FIVE years have elapsed since the Union visited Hebden Bridge, so that the local societies anticipated with pleasure the novelty of a visit by other naturalists to one of their most popular hunting-grounds; whilst to the latter the beauty of the scenery—so close to busy, smoky, manufacturing towns—came as a great surprise. The neighbourhood has bred not a few naturalists of repute, and records from it abound in the publications of the Union and other scientific papers and monographs.* Hence it was rather the desire to see the locality from which Prof. Phillips had received and described so many fossils, where Samuel Gibson 70 years ago collected all manner of things—fossils, plants, insects; where the Stansfields found ferns in endless variety; where in more recent years the hepatic *Jubula Hutchinsiae* and a host of fungi have been brought to light by the labours of Mr. Jas. Needham, than the expectation of adding to our knowledge of the district, that proved the main attraction of the excursion.

Happily the day selected was perfect. The general body of naturalists, under the leadership of Messrs. Crossland and Needham, first investigated the woods of the Hebden valley betimes (before the incursion of Saturday afternoon trippers to Hardcastle Crags), and after reaching Walshaw stepping-stones they left the valley to strike across country to Lumb Fall, and then descended Crimsworth Dean. Arrangements were made for another party, led by Messrs. Crump and Sutcliffe, to start at one o'clock, to suit those who could not reach Hebden Bridge before noon. This proved quite a success, though all those who set out could not be induced to abide by the official programme and return to Hebden Bridge for tea. Having been led to Crimsworth Dean, where first the geologists and then the main morning party were encountered, there they remained. In all sixty or more took part in the excursions.

The President (Mr. A. H. Pawson) occupied the chair at the general meeting held at the White Horse Hotel, at which fifteen societies were represented. Reports on the day's work were presented by Messrs. A. White, J. E. Crowther, G. T. Porritt, H. Ostheide, W. B. Crump, W. Ingham, C. Crossland, and E. Hawkesworth. Votes of thanks to the landowners, leaders, and the President were passed.

* The current issue of the Proc. Malacol. Soc. contains a description and figure of a new fossil shell (*Pleuromutilus pulcher* from Hebden Bridge).

The following reports are to hand:—

BIRDS.—Mr. H. Waterworth writes:—On the moors the Red Grouse, Common Plover, Curlew, Ring Ouzel, Twite, and Meadow Pipit were seen, and the Snipe heard. In the cloughs and woods I saw or heard the Blackbird, Song Thrush, Dipper, Sandpiper, Willow Wren (abundant), Chaffinch, Common Wren, Wheatear, Greenfinch, Red Linnet, Spotted Flycatcher, Pied Wagtail, Yellow Bunting, House Martin, Swallow, Swift, Tree Pipit, Blackcap Warbler, Robin, Cuckoo, Magpie, Hedge Sparrow, Blue Tit, Skylark, and Starling. The Kingfisher I learn was also seen. I found a nest of the Song Thrush, with three young; a Blackbird's nest, with a second batch of three eggs; a Common Wren's, full of young; and a Willow-Wren's, with five eggs. I also came upon a Song Thrush, which had reared two broods in the same nest.

INSECTS.—Mr. G. T. Porritt reports that the entomologists present, besides himself, were Messrs. H. Ostheide, J. W. Carter, H. Marsh, J. Beanland, Edward Halliday, and others. Lepidoptera seemed scarce, and only common species were noted. Neuroptera and Trichoptera were fairly numerous along the river, and among others *Tæniopteryx risi*, *Chloroperla grammatica*, *Isopteryx tripuncta* and *I. torrentium*, *Nemoura meyeri* and *N. cinerea* (both abundant), *Ecclisopteryx guttulata* (abundant), *Silo pullipes* (common), *Polycentropus flavomaculatus*, *Drusus annulatus*, and *Rhyacophila dorsalis* were noted.

Mr. J. W. Carter writes:—The Coleoptera Committee was represented by Mr. Ostheide and myself. The species enumerated were mainly taken by Messrs. F. Jowett, W. Mann, and myself, members of the Bradford Naturalist Society. Messrs. Jowett and Mann worked the Crimsworth Valley, whilst I devoted the whole of the day to the Hebden Valley. Beetles were considerably commoner in Crimsworth Dean than in the Hebden Valley, but neither produced any great rarities. The following is a list of the species observed:—

Notiophilus biguttatus F.

Leistus fulvibarbis Dj.

Nebria brevicollis F.

Loricera pilicornis F.

Pterostichus striola F.

Anchomenus angusticollis F.

Anchomenus albipes F.

Bembidium tibiale Duft.

Bembidium monticola Stm.

Trechus minutus F.

Lesteva longelytra Gœz.

Cryptophymus riparius F.

Athous hæmorrhoidalis F.

Adrastus limbatus F.

Dolopius marginatus L.

Corymbites pectinicornis L.

Corymbites cupreus F.

Corymbites cupreus var.

æruginosus F.

Telephorus abdominalis F.

Telephorus pellucidus F.

Telephorus limbata Th.

Telephorus pallida F.*Otiorhynchus picipes* F.*Phyllobius calcaratus* F.*Phyllobius alneti* F.*Phyllobius argentatus* L.

FLOWERING PLANTS AND FERNS.—Mr. W. B. Crump reports:—There was a large contingent of botanists from Halifax, Elland, and Huddersfield, also Messrs. T. W. Woodhead, C. E. Moss, W. P. Winter, and others, besides the cryptogamic botanists. There was no notable find, though the wealth of ferns in the cloughs caught everybody's attention, and the abundance of some species like Bistort was novel to at least some. The association of Bluebells, Bracken, and *Holcus mollis* was noticed to be a common feature in the Oak woods. Butterwort was found near Walshaw stepping-stones. *Oenanthe crocata*, *Asperula odorata*, *Cardamine amara*, *Geum rivale*, *Listera ovata*, and *Habenaria conopsea* were some of the rarer flowering plants observed in one or other valley. Specimens of Barberry from Hawksclough and of *Salix pentandra* from Walshaw Dean were also brought to the meeting. The Wall-rue and Polypody ferns were seen in one place on an old wall. Moonwort and Adder's-tongue were obtained near Shackleton in crossing from one valley to the other. The beautiful variety of the Male Fern with scaly rachis (*L. Filix-mas* var. *paleacea*) was common, as were *L. Oreopteris*, *L. dilatata*, and *Athyrium Filix-femina*, and of the last the variety *rheticum* was also seen.

MOSES AND HEPATICS.—Mr. W. Ingham writes:—The route taken by the bryologists along Hebden Valley to Hardcastle Crag, returning by Lumb Falls and Crimsworth Dean was very rich in these plants. Mr. Needham, who knows the ground so well, proved an admirable guide to the habitats of many rare mosses. This note would indeed be a long one were I to mention all the mosses and hepatics observed during the day, so it must suffice to mention those only which are additions to the plants mentioned in the Union's circular.

HEPATICS.—These are abundant and luxuriant in growth. The most important, next to Mr. Needham's great find of *Jubula Hutchinsiae*, is *Scapania subalpina*, which seems to be the dominant liverwort of the Hebden Valley. No doubt this plant has been mistaken in the past for *Scapania undulata*, which also occurs in this valley, but only in small quantity, compared with the rarer species. *S. subalpina* may be distinguished from the common *S. undulata* by the small size of the former, by the cells becoming suddenly smaller from the centre to the margin of the leaf, by the small distant teeth composed of only one cell each,

and by the cells of the leaf being punctate, as if pricked with the point of a needle. The distribution of this rare hepatic, as far as I know in England is (in addition to Hebden Valley), Deepdale, and Greta Dale, Bowes, where I found it during the meeting of the Y.N.U. last year, but did not determine it in time for the report of that excursion. (I found a very distinct variety of this plant, var. *undulifolia*, in a wet sandy ditch by the roadside from Wearhead to Langdon Beck in Durham.) *Jungermania gracilis* forms large tufts on the dry rocks on the moors by the roadside, and *J. sphaerocarpa* occurs by the river-side. In damp sandy holes occurs the beautiful *Kantia arguta*, and on the steep crags by the river-side are large, flat, brown tufts of *Saccogyna viticulosa*.

MOSES.—The rarest moss found is *Weisia crispata*, in fruit, on steep crags by the river-side. This moss, which might be confused with *Weisia tortilis* in the barren state on account of its broad nerve, also occurs in Jackdaw Crag Quarry, Tadcaster, on the limestone cliffs at Gilmanscar, Bowes, and by Welhope Burn, in Durham. *Plagiothecium Borrerianum* var. *collinum* occurs on the vertical face of a large stone. *Blindia acuta*, in fruit, occurs both in Hebden Valley, and at Lumb Falls, in Crimsworth Dean. By the same falls and in the spray of the water is a very fine and glossy, golden-yellow form of var. *majus* of *Plagiothecium denticulatum*.

FUNGI.—Mr. C. Crossland, F.L.S., reports:—The ground having been so well investigated during the last decade and a half, the mycologists did not, at this early period of the year, expect to add to the list of species. Two were, however, met with in the Hebden Valley, which are new to the parish, viz.:—*Polyporus brumalis* and *Cyphella muscigena*, the latter rather a rare species anywhere. Many old acquaintances were seen.

GEOLOGY.—Mr. E. Hawkesworth writes:—The most striking geological feature of the district was the examples it furnished of the cutting power of streams, especially when aided by the nature of the rocks cut through. A stream, even small, of fairly high gradient, and alternating beds of shale and harder rocks (in this case grits) present a set of conditions difficult to improve upon for the eventual formation of a deep picturesque valley. The stream, particularly when in flood and running through the shale, easily corrodes it, thus undermining the harder rocks above it, and great blocks of these will sooner or later, through lack of support, break off, and fall down. Nor is this the only action that would take place with such a rock

combination. The rain-water would easily percolate through the surface rocks, if of grit, and not only would the springs, which would naturally break out at its junction with the shales, tend to erode these, but masses of the overlying beds would come down over the slippery surface of the shale, in the form of landslips. All these features were noted in this district. The rocks all belong to the Carboniferous system, ranging upwards from the upper part of the Pendleside series, to the Kinderscout and Middle Grits, the grits forming bold craggy escarpments, the sides of the hills in many cases formed of slipped land, obscuring the rock-features, and the lower beds of Pendleside are exposed in the valley bottoms. The geologists, under the able leadership of Messrs. Brown, Fielding, and other local gentlemen, first examined the exposures of Kinderscout Grit, in Nut Clough, particularly noticing its coarse character. The quarries in the Middle Grits at Cock Hill were visited, but the two thin coal seams, which it was hoped to see, were covered with fallen débris. In the walls around were seen many pieces of Galliard, containing traces of *Stigmaria*, *Lepidodendron*, and other Carboniferous plant remains. Walking over Wadsworth Moor to Pecket Well, the fine stretch of country, with its glorious hills and dales, and its wealth of wood, was much admired. Crimsworth Dean was reached eventually, though, unfortunately somewhat late. There was barely time to appreciate its natural charms, and its interesting geology had to be glanced at very hurriedly. The main interest lies in the thick bed of Pendleside Shales, which the stream flows through for some distance. Up to a short time ago these were regarded as the upper beds of the Yoredale series of Jno. Phillips, but through the researches of Dr. J. Wheelton Hind, mainly palæontological, they are now put in the Pendleside series, above the Yoredales. The shales contain an abundance of impressions of fossils. W. B. C.

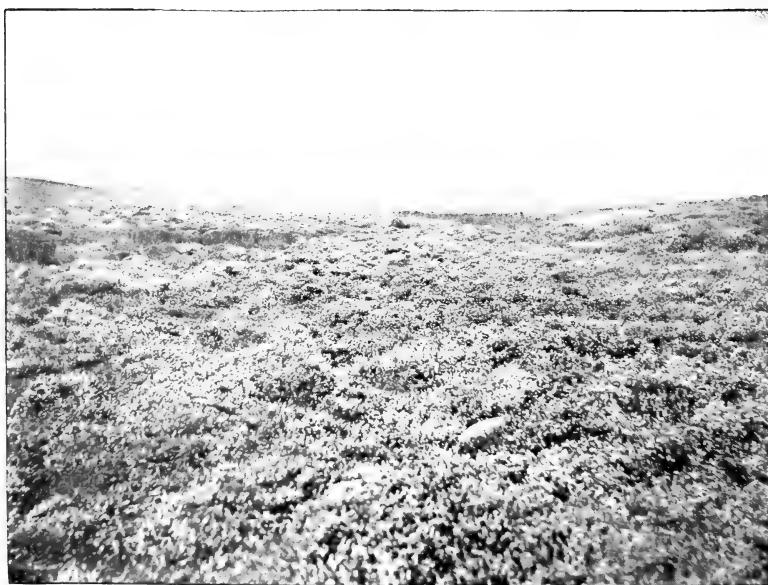
FLOWERING PLANTS.

Cypridium calceolus still in Upper Wharfedale.—

A plant in bloom of this rare orchid was found not many miles from here on 6th June. But of the locality I must not speak more particularly for obvious reasons. I hear already that an attempt has been made, but without success, to discover the single plant and dig up the root.—W. A. SHUFFREY, Arncliffe Vicarage, 21st June 1904.



Cotton-grass Moor in June.



Heather Moor in September.

PEAT MOORS OF THE PENNINES.*

In the 'Geographical Journal' for May is a paper by Mr. C. E. Moss, B.Sc., dealing with the peat moors of West Yorkshire, which will be worth perusing by all who are interested in the study of this deposit.

Mr. Moss classifies, in a general way, the peat moors of the Pennines into three kinds, which occupy definite relations with each other. The moor edges are either grassy or heathery, and the central mass is dominated by cotton-grass. The cotton-grass grows on peat from 5 to 30 feet thick, the heather on peat varying from 5 feet to an inappreciable layer, and the peat on the grassy moors is practically absent. Mr. Moss agrees with the commonly-expressed opinion that peat moors occupy the sites of former forests; and his evidence regarding a primitive Pennine forest is drawn from several sources. Place-names implying the existence of woods in former times on the Pennine slopes are exceedingly numerous. These place-names are of Saxon and Danish origin; consequently the author concludes that in Saxon and Danish times the Pennine slopes were extensively tree-clad. As regards the Pennine summits, however, Mr. Moss points out that the outstanding place-name is 'moss,' meaning a morass. Other place-names of the Pennine summits also meaning 'morass' are 'carr,' 'wham,' 'fen,' 'mow,' 'mere,' 'mire,' 'marsh,' 'swamp,' and 'bog.' Therefore, Mr. Moss concludes that, in Saxon and Danish times, when the Pennine slopes were tree-clad, the Pennine summits were covered with extensive morasses. The presence of buried timber in the peat, Mr. Moss argues, points to the existence of a primitive forest, even on the Pennine summits, at a date prior to that of the Saxon and Danish period. Below 1,250 feet records of buried timber in the peat are fairly numerous; from 1,250 to 1,500 feet they are rarer; while a few records exist even above 1,500 feet. On the slopes, from 1,250 feet downwards, Mr. Moss believes the oak to have been dominant in this primitive forest, while from that altitude upwards to at least 1,750 feet he thinks the birch was dominant—except on the limestone, where the ash was probably dominant. Mr. Moss supports the view that the Romans destroyed this primitive forest in their subjugation of the district, and quotes authors to bear out his opinion. The British remains are invariably found

* 'Peat Moors of the Pennines: Their Age, Origin, and Utilization.' 'Geographical Journal,' May 1904 (pp. 660-671), being a paper read before Section E of the British Association, Southport 1903.

below the peat ; and Pennine peat is never beneath glacial clay ; and Mr. Moss summarises by saying that the Pennine peat cannot be older than 2,000 years, and probably dates from the Roman conquest.

The author discusses at some length the conditions of peat formation ; and gives a diagrammatic section, showing the various layers of peat resting on moor-pan, which is instructive. In this five layers are indicated :—(1) growing plants ; (2) plant remains not sufficiently decomposed to be yet termed 'peat' ; (3) brown peat ; (4) black peat ; (5) thin layer of moor-pan ; (6) underlying subsoil. It is only recently that this moor-pan has been recognised ; but we remember a geologist of some eminence pointing out what was probably this layer as a thin seam of glacial débris. But this was a dozen years ago or more.

The Pennine moors, says Mr. Moss, represent a valuable asset which is turned to little account. Grouse are driven and shot over them, it is true. Of late years, too, town and city corporations have utilised the peat moors as gathering grounds for reservoirs ; but there is not a single peat factory on the whole of the Pennine Chain. Formerly the inhabitants of the moor-edges possessed turf-cutting rights ; but these in nearly all cases seem to have been lost. There is, Mr. Moss calculates, fuel enough in the Pennine peat to last the hillside population a thousand years. The grassy and heathy moor-edges are fit, with a small amount of preparation, to be at once either re-afforested or turned into farmland ; and as the peat is cleared from the higher altitudes, the surface thus laid bare could be given over to the farmer or the forester. In these days, when a shortage of timber seems to be the precursor of a timber famine, the question of the afforestation of waste lands is one that will more and more engage the attention of practical men ; and the author confidently expects that succeeding generations will undoubtedly see, what the Britons and the Romans in their times saw, the Pennine Hills clothed with trees.

We hope that Mr. Moss's interesting paper will create a new interest in these moors. Not only have the turf-cutting rights disappeared, but rights of way are becoming year by year more restricted, which could not occur but for the apathy of naturalists and pedestrians. The Pennine moors possess a grandeur peculiar to themselves, which is not fully appreciated. The views — from photographs taken by Mr. Crump — are representative of Pennine scenery, and we reproduce two of these by permission of the editor of the '*Geographical Journal*.'

DR. ROWE ON THE YORKSHIRE CHALK.*

J. W. STATHER, F.G.S.,

Hull.

THIS is a work to which East Yorkshire geologists have been looking forward with lively interest, because they have long wished to know how the scanty and peculiar fossil fauna of their native wolds compared in detail with the richer and better known beds of the southern counties. So when the rumour travelled northward that Dr. Rowe, of Margate, the authority on the palæontology of the chalk of the South of England, was about to visit Yorkshire, the news was received with the greatest satisfaction.

Dr. Rowe's work in the south is now so well known that perhaps it is almost unnecessary to remind the readers of 'The Naturalist' that the line of geological research which he has made particularly his own, is that which relates to fossils of the Chalk and their distribution into zones. From a naturalist's point of view the paper under notice is a delightful one. The keen and enthusiastic collector is in evidence on every page, and the hunt for specimens is described so graphically and with such zest, that an almost irresistible impulse impells the reader to rush into the field with hammer and chisel and join in the chase.

Dr. Rowe's attitude towards the zonal problem which confronted him in Yorkshire may be gathered from the following sentences taken from the introduction to the paper:—'We have long cherished a furtive ambition to explore this mysterious and legendary coast, but have deliberately refrained from so doing until such time as we had been able to study the bulk of the White Chalk of the South of England, so that haply we might arrive at some idea as to the average or normal in the distribution of the fossils in their various zones.' . . . 'There is a glamour and fascination attached to the unknown, which coupled with the acknowledged difficulties of a coast like this, greatly adds to the zest of the work. For this coast is unknown. It is a veritable *terra incognita*.' At first sight all this appears to be stated with unnecessary strength of colour, but when we remember that Dr. Rowe is here referring to purely zonal work,

* 'The Zones of the White Chalk of the English Coast.' Part IV. Yorkshire. Proc. Geol. Assn., Vol. 18, Part 4, 1904. An index to this, and also to the other three papers on the English Chalk, has been compiled by Mr. C. D. Sherborn, and appears in Part 7 of the same Proceedings.

and note also the author's striking way of putting things, we can excuse the seeming overstatement of the case.

Speaking of previous workers in the Yorkshire area he says: 'Dr. Barrois' great work is the only one which contains a serious attempt to grapple with the zonal problems of this coast, and for once, we must frankly own, we cannot follow him in his data or conclusions.' This estimate of Barrois' work, we imagine, will not surprise East Yorkshire geologists, for in several important particulars his conclusions have never been accepted by local observers. Possibly it is to this work Dr. Rowe refers when he mentions the 'legendary' side of the subject.

With regard to the special difficulties of Flamborough Head geology, Dr. Rowe says 'that this section presents many physical difficulties we readily admit, but we question if they are as insuperable as has been maintained.' This remark apparently applies to some other 'legend' for which we are quite sure Yorkshiremen are not responsible. As might be expected the Flamborough Head sections vary in difficulty, some being exceedingly difficult to work and others extremely easy. In a general way it may be said that there are two difficulties which collectors from the Yorkshire Chalk have to face, (1) that arising from the hardness of the rock and the paucity and bad preservation of the fossils, and (2) the inaccessibility of many miles of cliff on the northern side of the headland. Equipped with probably an unrivalled knowledge of the plentiful and comparatively easily determinable fauna of the Southern Chalk, Dr. Rowe has been able to deal with the first of these difficulties far more thoroughly than any worker who has preceded him in Yorkshire, and has achieved the remarkable results so clearly shown in the paper before us. On the other hand, the cliffs of Buckton and Bempton are still unconquered, and along the long and lofty line of weathered cliff faces between Crow Shoot and Thornwick the Guillimot and the Razorbill still hold their court undisturbed by the geologist. However, we must not overlook the excellent use Dr. Rowe has made of the poor and not by any means easy section at Crow Shoot, the successful interpretation of the overthrust fault near Kit Pape's Spot, and the viking-like raid and the 'lifting' of the anticipated and coveted Micraster near Brail Head.

On the other hand, the whole of the cliff sections on the south of the Headland can be approached at almost any condition of the tide, and present no manner of physical difficulty to

the collector. This is sufficiently manifest from the fact that Dr. Rowe got a general idea of the fossil contents of the beds between High Stacks and Sewerby 'in five hours.'

A glance round Mr. Mortimer's Driffield Museum or any of the smaller private collections of fossils from the Chalk is sufficient to show that Yorkshire differs widely from the southern counties, and we were not prepared for the extreme surprise expressed by Dr. Rowe on this point. He says: 'It is impossible to institute any valid comparison between this marvellous coast and any of the sections which we have previously described. For, alike in the hardness of the rocks, in the peculiar lithological conditions of the beds, in the paucity of the fossils; in their deplorable state of preservation, and in their strange and unwonted distribution, we have no parallel to it on our English shores. It is unique—a thing apart.' But in his endeavour to put this point vividly before his readers Dr. Rowe has somewhat overstated his case and thereby done himself an injustice. For in our opinion the great value of the paper lies in its careful proof that the fauna of the Yorkshire Chalk can be brought approximately into line with that of the south country. Of this part of Dr. Rowe's work it is impossible to speak too highly. It is a model of assiduous and intelligent collecting from every reasonably accessible section around the headland from Speeton to Sewerby. The result is a comprehensive and detailed account of the fauna of the Middle and Upper Chalk of Yorkshire of the greatest possible interest. And now, not only have local workers a reliable basis from which to continue their investigations, but in many instances the direction is indicated in which further work is necessary and where it is most likely to succeed. In a word, the paper marks the beginning of a new era in Upper Cretaceous geology in Yorkshire, and we believe it cannot do otherwise than help and inspire our East Riding geologists in their work, and cause many a section formerly regarded as stale and hopeless to be attacked with renewed zeal.

The difficulties met with by Dr. Rowe when he applies his southern zonal formulæ in Yorkshire, appear to be of a similar kind to those encountered by the vendor of ready-made clothing in his attempts to suit all customers. The garments only fit in a general sort of way, and a good deal of pulling and pinching and contriving are necessary to make them pass muster. At the same time we are compelled to admit that Dr. Rowe's skill in this direction is unsurpassable.

The fact that there is an essential difference between the character of the zones in the Yorkshire Chalk and the better defined zones of some other fossiliferous beds, for example, those in the Yorkshire Lias, must impress itself on every worker who has studied zonal divisions in other formations. The limits of the ammonite zones of the Lias can in many cases be verified without difficulty even by the tyro, but the longer one has worked the Yorkshire Chalk the greater has one found the difficulty in defining the upward or downward limit of any particular fossil; and these limits seem to depend so largely upon the accident of collecting that the same observer, working at different times, will find, in our experience, that his boundaries are constantly shifting. Most of the fossils are sprinkled so sparingly through the mass that any particular section may give a result differing by many feet at least from another section. And the zones therefore fade into each other imperceptibly like the colours of the spectrum. This difference between the Chalk and the Lias must imply some essential difference in the conditions of deposition, as the only sharp boundary known to the present writer in the Yorkshire Chalk represents a hiatus which is strongly marked both stratigraphically and palæontographically, and is indicated by the band of black shale at the base of the Middle Chalk. But, as Dr. Rowe has dealt only with the Chalk, his idea of a zone relates to Chalk zones alone, and this should be remembered by Yorkshire readers of his paper. Indeed, the opening sentence of his paper shows that to him the Chalk is apparently the only rock worth recognising on the coast, for he says: 'The Yorkshire coast . . . has been one which has been severely left alone by zonal geologists.'

It must strike the reader of this paper that the names of some of the zones as applied to Yorkshire are scarcely well adapted for the purpose. For we find on comparing the lists of fossils from the various beds, that among the fossils which are used to distinguish the zones some are not confined to the zones they represent, while others are exceedingly rare or entirely absent from the beds. However, we are glad to note that to meet this difficulty, Dr. Rowe has in two cases suggested local zone names, and the cases where the southern zonal name is allowed to stand are always accompanied by a clear statement of the exceptional conditions of distribution. But, nevertheless, it is our opinion that, unless a fossil name is forthcoming that fairly well represents the limits of the zone, it would be better, for the time being at any rate, to fall back upon a purely arbitrary

method of nomenclature and denote the zones by letters or by numbers rather than by fossil names.

The get-up of the paper, as one might have expected, is in every way excellent. It runs to 100 pages and is well illustrated with photographs of the sections, overlaid in most cases with transparent keys showing the divisions of the beds. The map and the diagrams of the coast sections at the end of the paper are by Mr. C. D. Sherborn, and strangers to the coast will find them very useful.

In his concluding remarks Dr. Rowe refers in a very kindly manner to the geologists he met with in East Yorkshire, and has many pleasant things to say about them, such as the following:—‘It is a novelty to meet with any local geologists in the course of our work, and our stay in Yorkshire has been rendered by contrast all the more pleasant by reason of the kind and generous treatment which we have received at the hands of the members of the Hull Geological Society. They have acted as our guides to this coast, freely lent fossils, and given all information in their power.’ And again, when referring to the large model of Flamborough Head made by Mr. Sherborn to illustrate the paper, he says: ‘We have presented this model to the Municipal Museum of Hull as a small token of our gratitude to the members of the Geological Society of that city.’ We can assure Dr. Rowe that this feeling is strongly reciprocated, and that our gratitude to him for his valuable paper is deeply felt and heartily acknowledged.

MOLLUSCS.

***Helix lamellata*, etc., near Scarborough.**—In the conchological report of the recent excursion of the Yorkshire naturalists to the moors north of Scarborough, it is stated that search was made for *Helix lamellata* without success. It may therefore be worth recording that I took some live examples in that district yesterday, 13th June, not, however, upon *Luzula*, but in the habitat usually given for the species—dead holly leaves. This tiny shell has a curiously misty outline, owing to the lamellæ that adorn it. I have not seen this appearance alluded to in any mention of the shell, but it affords an easy method of identifying the species in the field even without a glass. *Helix lamellata* was accompanied by a large quantity of *Zonites fulvus*, *Helix rotundata*, and *Pupa umbilicata*, and a few *Helix aculeata*, *Zonites parus*, and *Vertigo pygmæa*.—W. C. HEY, West Ayton, 14th June 1904.

NOTES ON YORKSHIRE BRYOPHYTES.

III. *REBOULIA HEMISPHERICA* (L.) RADDI.

F. CAVERS, D.Sc.(LOND.), F.L.S.,

Municipal Technical School, Plymouth.

THE species here dealt with, although differing in many respects from the other thalloid or ribbon-like liverworts found in Britain, and presenting some peculiar and interesting features in its structure and biology, has not up to the present time been adequately worked out and described. It is hoped that in this paper botanists may find a fairly complete and straightforward account of this liverwort, based on the writer's own observations of abundant living material. By omitting minute details of development in which this plant does not differ materially from its allies, and by avoiding as far as possible the technicalities which might repel readers who had not given special attention to the liverworts, or hepaticæ, as well as by adding a fairly liberal amount of illustrative matter, the writer also hopes that botanical readers in general may find recorded here some interesting points in the biology of this comparatively little-studied group of plants.

Reboulia is distributed pretty widely in Britain, but its occurrence in any locality is usually confined to small patches, growing on damp soil or rocks. The writer has collected it in considerable quantity on limestone rocks in the Gordale and Malham district, and in Yorkshire, as in other parts of the country, it appears to be practically confined to limestone.

The flat, ribbon-like thallus (Plate VIII., Fig. 1) seldom exceeds 5 cm. (2 inches) in length and 1 cm. in breadth, and is usually forked repeatedly at the front. The margins are wavy and wrinkled and usually tinged with purple. The upper surface is pale green in colour, and is dotted with numerous small pores, so as to present a granular and finely-netted appearance, very unlike the definite aerolation found in forms like *Fegatella*, which grows so commonly besides streams. The growing-point lies in a notch at the front of each branch of the thallus. Besides the ordinary apical branching, the thallus often shows branches arising from the lower surface, usually just below the apex. These ventral branches grow forwards and spread out, and ultimately branch by forking, thus giving the whole plant a jointed appearance

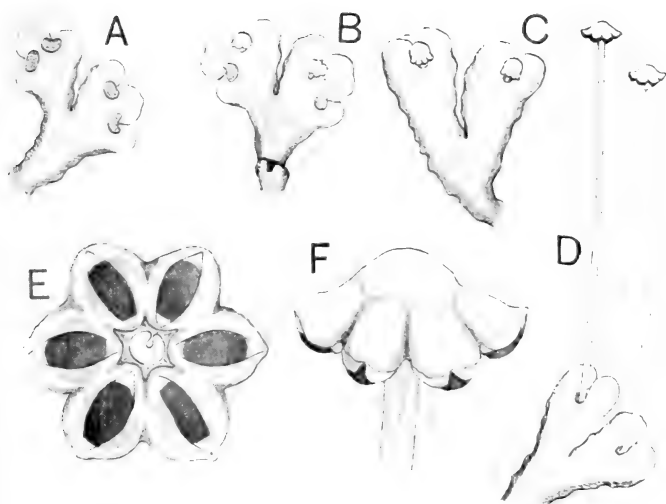


Fig. 1.—A.—A male plant, with four receptacles. B.—Plant with four receptacles, the two outer ones male, the two inner female. C.—Female plant with two receptacles, which are nearly ripe but still almost sessile. D.—Female plant, similar to C., after the elongation of the receptacle stalks, carrying up the receptacles, the lobes of which are now expanded. E.—Female receptacle from below, showing the grooved stalk (in the centre) and six involucres, from which the capsules protrude. F.—The same in side view, showing the hairs around the top of the stalk. A.-D., natural size; E., F., $\times 6$.



(Plate VIII., Fig. 1, B.). The formation of such branches is almost invariably seen after a female receptacle has been developed.

The thallus varies considerably in external form and in colour, this species being the most polymorphic of the British Marchantiaceæ. When growing in moist and shaded situations, the thallus branches freely at the apex, and its broad spreading lobes are bright green in colour. Plants growing in drier places, especially where exposed to full light, are deeply tinged with purple, and the branches are shorter, broader, and more fleshy than in the case of shaded plants.

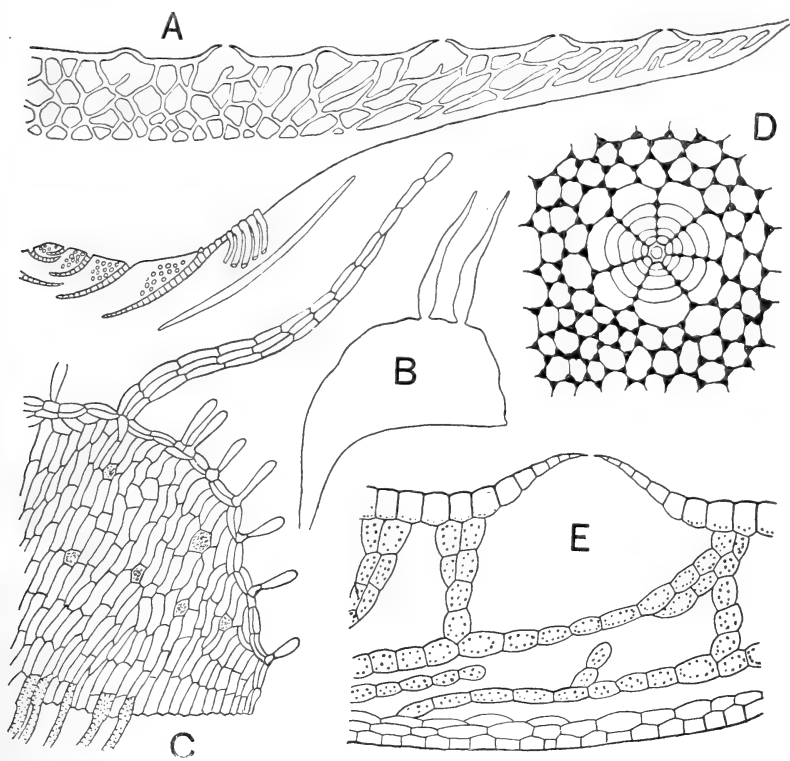


Fig. 2.—A.—Part of a transverse section of the thallus, showing the dorsal zone of green air-chamber tissue and the ventral zone of compact colourless tissue. On the midrib are shown the ventral scales in section, the small tuberculate rhizoids, and the large smooth-walled rhizoids. $\times 35$. B.—A ventral scale, showing two long narrow appendages. $\times 35$. C.—Part of a scale, showing one of the appendages, several marginal mucilage-hairs, some of the oil-cells (shaded), and some tuberculate rhizoids springing from the base of the scale. $\times 150$. D.—Part of the dorsal epidermis in surface view from above, showing a pore surrounded by six concentric rings of cells, the walls of which, as in the rest of the epidermis, show angular thickenings. $\times 150$. E.—Part of A, showing the structure of the lateral region (lamina) of the thallus; the compact ventral tissue is here reduced to two layers of cells. $\times 150$.

Sections taken through the growing-point of the thallus show, in the youngest parts, a single layer of air-chambers, each opening on the upper surface by a small pore. In all the other Marchantiaceæ found in Britain, this condition of things remains unaltered, that is to say, the thallus shows, even in the oldest parts, only a single layer of air-chambers towards the upper surface, each chamber opening by a pore. In *Reboulia*, however, each of the primary chambers becomes at an early stage divided up in a rather complex manner by means of plates of tissue which grow in from the sides, floor, and roof of the chamber. The upper part of the thallus thus comes to consist of a spongy mass of green tissue, made up of numerous

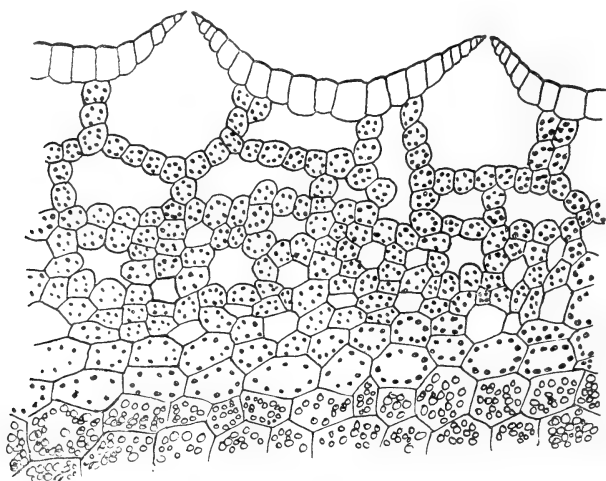


Fig. 3.—Part of a transverse section of the thallus, showing the upper spongy tissue with two pores, and portion of the lower compact tissue with starch-containing cells. $\times 150$.

chambers, which vary considerably in form and size (Fig. 2, A., E.; Fig. 3). Along the midrib of the thallus this spongy tissue is seen in sections to become gradually merged below into the compact ventral tissue. In the thin lateral wings of the thallus, the air-chambers are usually reduced to a single series, and here the underlying compact tissue consists of from one to three layers of cells. Except in the neighbourhood of the growing-point, it is not possible to make out the original limits of the primary air-chambers, but the process by which they become partitioned up can easily be followed, especially in serial microtome-sections, in the region immediately behind the growing-point. The superposed chambers communicate with each other

by irregular openings in the partitions, and ultimately with the air by means of the pores in the dorsal epidermis.

The EPIDERMIS, forming the upper limit of the green tissue, consists of a layer of large cubical or oblong cells, which usually contain very few chloroplasts and have their outer walls thickened. The lateral walls are also thickened, especially at the angles between adjacent cells (Fig. 2, D.).

The PORES are narrow, but easily observed with a lens or low power of the microscope. With a lens, each pore is seen to stand on a slight prominence on the upper surface of the thallus, and to be surrounded by a whitish rim. This rim consists of five or six concentric rings of cells, each ring consisting usually of six cells (Fig. 2, D.), which contain few or no chloroplasts. The innermost ring bears a membranous ingrowth of cellulose which is covered with fine grains of a waxy or resinous substance. When water is placed on a fresh plant, little or none of it is found to have entered the chambers, but the latter are found to be waterlogged when the plant has been previously soaked in alcohol, which dissolves the grains, so that this coating apparently serves, as first suggested by Kny* in the case of *Marchantia*, to prevent the entrance of water into the air-chambers.

The VENTRAL TISSUE of the thallus is practically confined to the midrib, being reduced to two or three layers or to a single layer of cells in the wing on either side. In the midrib this tissue consists of from 10 to about 20 layers of polygonal cells, containing starch-grains (Fig. 3). Here and there we find single cells almost filled by a large brownish oil-body. Similar bodies occur in many other liverworts, both thalloid and foliose, and they were first carefully studied by Pfeffer,† who found that they contain water, a proteid substance, oil, and in some cases tannic acid, these constituents being mixed and forming an emulsion, held together by an envelope of proteid matter. Later observers (Küster,‡ Garjeanne||) have shown that each oil-body consists of a proteid ground-mass in which the oil and other substances are embedded, and the writer's observations agree with this. In some cases these oil-bodies give the whole plant a characteristic odour, which is especially marked in *Fegatella*, less so in

* Bau und Entwicklung von *Marchantia polymorpha*. (Aus dem Text der Abth. 8 der 'Botanischen Wandtafeln.') Berlin, 1890; p. 369.

† Die Oelkörper der Lebermoose. Flora, 1874.

‡ Die Oelkörper der Lebermoose und ihr Verhältnis zu den Elaioplasten. Inaug. Diss., Univ. Basel, 1894.

|| Die Oelkörper der Jungermanniales. Flora, 1903, p. 457.

Reboulia. When once the oil-bodies are formed, they appear to remain unchanged until the death of the cells containing them; plants may be kept in darkness for weeks, and the new parts formed are found invariably to contain oil-bodies, whilst those already present in the older parts remain unaltered. These bodies can therefore only be regarded as products of excretion, but they appear to play an important part in the economy of the plant, since, as shown by Stahl*, they serve to protect the thallus against the attacks of snails and other animals. Snails or slugs will shun fresh pieces of the thallus even when there is no other available food, but if the pieces are soaked in alcohol (to remove the oil) and washed in water, they will be readily eaten by these animals.

Other cells of this compact tissue contain mucilage, which readily absorbs and stores up water. Both oil and mucilage cells are sometimes found in the partitions between the air-chambers, but they are most abundant in the compact tissue of the midrib. The lowest cells of this tissue, especially in the thin lateral parts of the thallus, frequently have their cell-walls coloured deep red or purple.

On its lower surface the midrib bears two rows of scales, one on either side of the middle line, together with numerous rhizoids, the latter being of two distinct kinds, described below.

The VENTRAL SCALES arise in two rows from the sides of the midrib. They are broad and closely overlap each other, but do not reach the margins of the thallus. Each scale is roughly semicircular or scimitar-like in outline, with a narrow basal prolongation which extends inwards nearly to the middle line of the thallus, while its free rounded margin bears in most cases two long, narrow, pointed appendages (Fig. 2, B.). Frequently the scale bears only one of these appendages, occasionally there are three of them. In the youngest scales, near the growing-point of the thallus, these appendages curve upwards and occupy the groove in which lies the row of initial-cells. The appendages are developed before the rest of the scale, and have become deeply tinged with purple while the broad basal part of the scale is still green or colourless. The cells of the young scale contain protoplasm, chloroplasts, and starch-grains, and the marginal cells frequently grow out as club-shaped mucilage-hairs. The fully-developed scale consists of a single layer of cells, most of which have lost their original contents and have deeply-coloured walls. At the base of the scale, along its

* Pflanzen und Schnecken, Jena, 1888; p. 49.

insertion to the thallus, the cells are usually living and capable of division, so that, except in the oldest parts of the thallus, the scale continues to grow in breadth. Here and there among the dark-coloured cells there occur cells with lighter or even colourless walls; each of these cells contains an oil-body (Fig. 2, C.).

The RHIZOIDS which spring from the lower surface of the midrib are of two kinds, some having smooth walls, whilst in others the inner surface of the cell-wall shows numerous peg-like ingrowths; the latter are usually distinguished as tuberculate rhizoids. The smooth-walled rhizoids spring from the sides of the midrib and pass straight down into the soil where their ends often become branched. Most of the tuberculate rhizoids grow from the basal cells of the scales themselves, the rest from the adjacent surface-cells of the midrib, and they run back and join to form a bundle which occupies a median longitudinal groove on the surface of the midrib (Fig. 2, A.). The tuberculate rhizoids generally end freely in this median bundle, and their ends do not become branched. Each rhizoid is formed by the continued growth of a single superficial cell, and does not show any divisions. The smooth rhizoids serve to attach the plant to the soil and also to absorb water, whilst the tuberculate ones appear to have the function of storing water, which is contained both inside these rhizoids and in the capillary spaces between them. The scales cover the tuberculate rhizoids and thus protect them against evaporation and further increase their capacity of retaining water by means of capillarity.

As might be expected, plants of different habitat are found to differ in internal structure as well as in external form. It will be sufficient to compare with the account just given of a typical plant (one growing in open but fairly moist surroundings) the structural characters found in (1) a plant growing in a drier and more exposed situation, (2) one growing in a moister and more shaded situation. (1) In plants of xerophilous habitat the compact tissue is greatly developed, so that the midrib becomes fleshy in texture, serving to store water and reserve food; the epidermal cells have strongly thickened walls and contain little or no chlorophyll; the pores are very narrow; the rhizoids are abundant, and those of the tuberculate type have the projections on the inner wall-surface long and often branched at the ends; and there is a deep purple colouration in the ventral scales and in all the tissue lying towards the ventral surface and at the margins of the thallus. (2) On the other

hand, in what might be termed a hygrophilous form, the whole thallus is broader and thinner, the reduction in thickness chiefly affecting the compact tissue of the midrib; the cells of the epidermis have thinner walls and contain numerous chloroplasts; the pores are wider; the rhizoids are fewer, and the peg-like ingrowths of the tuberculate kind are shorter; and the cell-walls in the ventral scales are colourless or only slightly tinged with purple.

THE FINDING OF A FAMOUS EAST YORKSHIRE DIATOM.

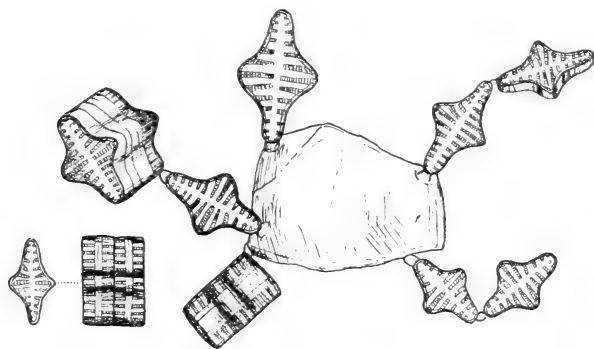
R. H. PHILIP,
Hull.

In view of the great number of works on the Diatomaceæ now existing, one scarcely realises how recent the study really is. The earliest book which Van Heurck in his bibliography of the subject considers worth mention is Agardh's 'Conspectus Criticus Diatomacearum,' published in 1830; and until the appearance of Rev. Wm. Smith's 'Synopsis of the British Diatomaceæ,' in 1853-56, the only works in English were casual references in books devoted to the Algæ generally, such as those of Hassall and Greville, and still more casual papers in the microscopical journals.

But in the fifties a strong interest in this subject set in, and among many ardent workers a little group of Hull naturalists gained a prominent place. The names of Norman, Harrison, Sollitt, and Munro are well known to all Diatom students. Norman's patronymic has been immortalised in the specific titles of several species, but these are either exotic or fossil forms. Sollitt has given his name to *Aulacodiscus Sollittianus*, but this was also a foreigner, until the writer, a few years ago, found it living in the river Hull. The name of Harrison is, however, appended to one of special interest to us, as it was found first in our neighbourhood, and figured and described from our local work. *Fragilaria*—or, as it was first named, *Odontidium Harrisonii*, is stated by Van Heurck to be very rare, and though occasional frustules may have been found in many places, I am not aware that there is any locality where it can be found so certainly and so abundantly as in the Haltem-price springs, about three miles from the Hull City boundary.

Naturalist,

Recently, among some papers left by the late Mr. Harrison and handed to the writer for examination, were found a number of letters from Dr. Walker Arnott, of Glasgow, from which one may gather in an indirect manner (like overhearing half a conversation by telephone) some interesting particulars respecting this discovery. It appears that Mr. Harrison, while taking a walk across the fields near the remains of the ancient Priory of Haltemprice, observed a spring welling up from the ground in a little sandy basin, the sand in continual motion, thrown up by the bubbling of the rising water. It occurred to him to take some of the sand home for microscopic examination, and he was greatly surprised to find the granules were coated with numbers of diatoms, having a cruciform valve, marked with radiating striæ and a bale-shaped side view, as well shown in Smith's figures here reproduced.



Fragilaria Harrisonii on a Sand Grain.

This form was quite unlike anything Mr. Harrison had previously found, and he consulted with Mr. Sollitt, to whom it was also a novelty. At first they supposed they had got *Tetracyclus lacustris*, an alpine form found in Scotland and the Lake District. This does not say much for the definition of their instruments, as the two forms have nothing in common save a general resemblance in the outline of the valve view. Both the Hull diatomists were at that time in correspondence with Dr. Arnott, who was a leading authority of that day, and they forwarded a slide of the new discovery to him for identification. Dr. Arnott appears to have been equally puzzled. He writes to Mr. Harrison that he has sent the 'Tetracyclus' to the Rev. Wm. Smith (the author of the Synopsis) and adds: 'It may be that species, but I hope it is something new. It seems to me rather liker the genus *Odontidium*.'

Then in a subsequent letter he sends the following report from Rev. W. Smith :—‘The slide marked *Tet. lacustris*, from Hull, is a very interesting one. I have written to Mr. Sollitt for information about it. It is not a *Tetracyclus*, not having one single character in common with that genus. Its mode of growth is essentially distinct, growth in *Tetracyclus* being indefinite, and in this form definite. I call it pro tem. *Odontidium Sollittii*. It is precisely my *Odontidium tabellaria* in a giant state, as far as the general character and appearance go, but it is certainly distinct, and I believe has never been figured or described. I hope it is a native that I may give it in my addenda.’

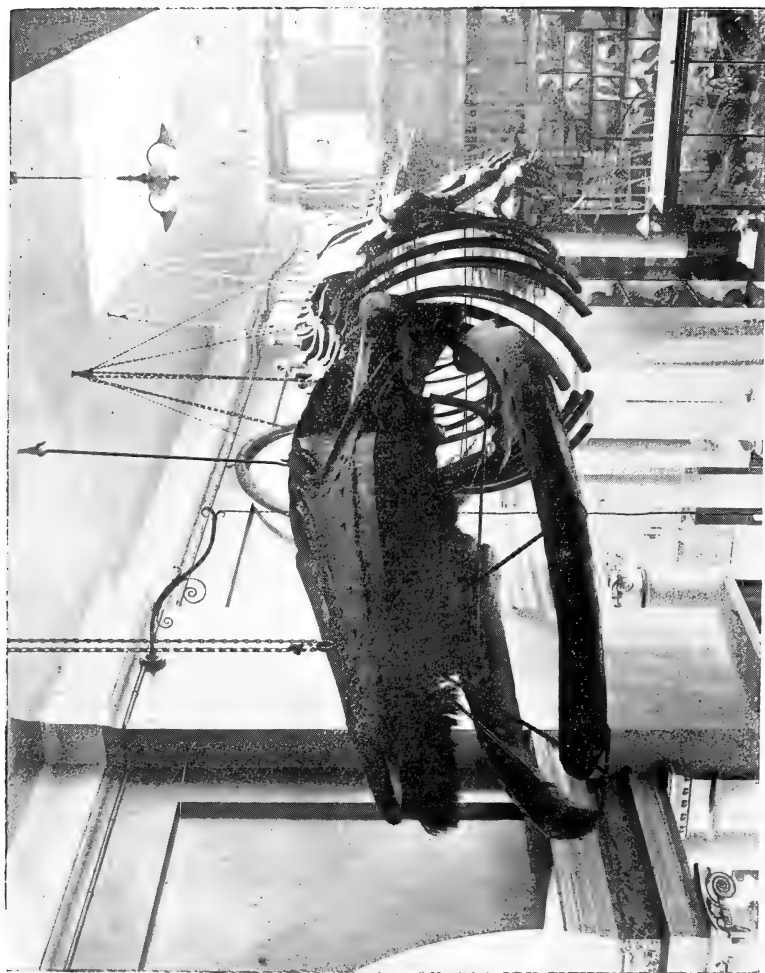
To this Dr. Arnott adds :—‘I understand it was you and not Mr. Sollitt who gathered it. If so it ought to be called *Harrisonii* not *Sollittii*, but you and he must settle that point.’

The point was settled by giving the new discovery the name of *Odontidium Harrisonii* W.Sm. Subsequent writers have, however, cut up the genus *Odontidium* and divided it between *Diatoma* and *Fragilaria*, whereupon this form became *Fragilaria Harrisonii*.

But it seems it is not to be allowed to rest there. Peragallo in his recent work, ‘Les Diatomées Marines de France,’ separates certain of the genus *Fragilaria*, on the ground of a difference of endochrome, which he finds to be in plates instead of granules, as in the rest of the genus. If this author should be followed our diatom will in future be known as *Staurosira Harrisonii*.

BIRDS.

Pochard Breeding in South-east Durham.—In the spring of 1903 a pair of Pochards successfully nested and brought off a brood of young on one of the large reservoirs of South-east Durham, and in April of this year they again appeared on the same sheet of water. The nest was built at the foot of a Willow bush about five yards from the water, and two eggs were laid by 6th May, when misfortune overtook them. On the 8th the eggs were found broken outside the nest, the work of a dog or Carrion Crow, and on the following day the drake was picked up wounded, and died shortly after. As may be expected, the female has sought more congenial quarters ; it is to be hoped with better results.—C. E. MILBURN, Middlesbrough.



Type Specimen of Sibbald's Rorqual (*Balænoptera sibbaldii*), Hull Museum.

REVIEWS AND BOOK NOTICES.

The recently published 'Guide to the Hull Municipal Museum' is an excellent little handbook containing a large amount of information condensed into its 35 pages. It is illustrated by a plan—in which every case has a reference mark—and by two views of the interior; it is also fully indexed. Not the least of its merits are that it is printed in large, clear type and is leaded. The publication of this guide for the moderate price of one penny, is a striking tribute to the energy and public spirit of the Hull Museum authorities.

The guide begins with a brief history of the collections from their humble beginnings in 1823 to the present day. The various departments are then dealt with separately. Under the head of British and Anglo-Saxon Antiquities, a clear and concise description is given of the early history of the county as deduced from objects found in excavations, etc., but it would perhaps be better to separate the Stone Age distinctly from Celtic and later antiquities. We read on p. 13 that 'the Anglo-Saxons are known to have visited Eastern England during the fifth and sixth centuries,' but the term 'visited' is somewhat euphemistic when applied to the action of our forefathers in the sixth century. The Celtic inhabitants would probably have used a stronger word. The exhibition of a case of objects from the tumulus of Efaefsk is an admirable plan and affords the visitor an opportunity of seeing how wide-spread was the early culture illustrated by the burial mounds of East Yorkshire. Roman antiquities are wisely exhibited by themselves, and Hull is fortunate in possessing a good representative series of Roman pottery.

Under the head of 'General Antiquities' are included a number of objects, now obsolete, ranging from Norman times to the last century. The plan of preserving objects that have but recently gone out of use is most commendable; these things are antiquities in the making, and may in the course of a few years become unobtainable. A special and highly-interesting feature of the museum is the collection of Hull Whaling Relics exhibited in a special case. The industry is, alas! extinct, and the collection has an historic importance. The Ethnological collection is, as might be expected in the case of an important seaport, exceptionally good. One case is devoted entirely to the foot-gear of various nations; another to leather utensils of different kinds. As an instance of the care taken in conserving objects which narrower-minded archæologists might be apt to despise,

we might mention a collection (exhibited in one of the temporary cases) of old Fire Insurance Plates.

The Natural History side of the museum is well developed, and the Curator has wisely not confined himself to classified groups of stuffed animals and skeletons, etc., but has given illustrations of such principles as 'mimicry,' 'protective colouring,' and so forth. Series exhibiting the life-history of metabolous insects, a freshwater aquarium, and a vivarium (for reptiles) are other means successfully adopted for rousing and stimulating the interest and curiosity of the visitor.

On the whole, we can heartily congratulate the city on having not only an excellent museum, but also that which is indispensable for its interpretation—a clear and interesting guide-book.

H. M. P.

The Flora of the Parish of Halifax. By **W. B. Crump, M.A.,** and **Charles Crossland, F.L.S.** Demy 8vo., 392 pp. 10s. 6d. Halifax Scientific Society.

This flora is a most welcome addition to the botany of Yorkshire. It is 16 years since Lees' 'Flora of West Yorkshire' was published, and when we consider that much of this was written long before then, we are glad to see what new light can be thrown on any part of the area. The flowering plants and ferns are dealt with by Mr. Crump and the lower cryptogams by Mr. Crossland. The parish is an extensive one, containing 129 square miles, and is to a great extent a natural geographical division. As we are told, it is essentially a moorland plateau, descending eastwards from 1,500 feet to 500 feet in 15 miles. The district lies on the Yoredale Rocks, Millstone Grits, and Lower Coal Measures, so, with an alternating series of Sandstones and Shales, the geology is simple from a botanical point of view. Only a very small part of the parish descends below 300 feet, and therefore offers exceptional opportunities for studying problems of plant distribution in at any rate one of its important phases.

A third of the area is moorland, the rest chiefly reclaimed moorland or woodland. In such an area we cannot expect a very rich flora, and only about 400 species of *native* flowering plants are recorded.

The first chapter deals in a most interesting manner with these features, and also with Climate and Rainfall. In the second chapter the vegetation of the parish is described under the head of 'Plant Distribution and Associations.' Here we

Naturalist,

have, for the first time in a local flora, an attempt to describe the vegetation of an area as distinct from its individual and especially rarer species. This is on the lines adopted by the late Robert Smith in Scotland, and is one of the most valuable features of the work. As we glance over the pages we are at once struck with the fact that the elements of the flora have long been thoroughly investigated by generations of able botanists, among whom are conspicuous Bolton, Leyland, Gibson, King, Nowell, and, more recently, Soppitt. Few parishes can boast of such a long line of widely-known workers, and it is a pleasant feature that their records stand out prominently; in fact, the additional localities and records occupy quite an inconspicuous position.

These men laid the foundation; it remained for present-day botanists to collate their records, and to deal in the light of newer methods with the problems affecting the distribution of species. It is in this respect that the Flora stands out in striking contrast to previous efforts, and the authors are to be congratulated on their attempt to apply the principles of plant associations to it.

The Flora has been issued as a supplement to the 'Halifax Naturalist' from 1896. In 1900 the introductory chapters were written, that is, in the same year as the Botanical Maps of Edinburgh District and North Perthshire, by Robert Smith, and three years prior to the appearance of Smith and Moss's Botanical Map of Leeds and Halifax District.

This, then, is one of the earliest attempts, but in the interval, brief as it is, much progress has been made. The parish is a very favourable one for the purpose, as the area is primitively a moorland plateau, with relatively few disturbing elements to complicate the discussion. Such being the nature of the district, we are not a little surprised to find the authors commencing their account of associations with the lowland division, including aquatic plants, plants of cultivated ground, and railway banks. In our opinion a more natural starting-point would have been the areas still in their primitive condition, the vegetation of the high moorlands, and after discussing the associations of this region, to descend to the cultivated areas, considering by the way, the influence of man in modifying the flora. The importance of this is, that it would have suggested many important considerations as to the citizenship of numerous species; as it is the authors regard as natives a number of plants which surely can have no claim to be such in what is confessedly a moorland

area, some of the species so characterised being recorded only as weeds in cultivated ground or waste heaps and gardens (see pp. 88, 90, 91, 94, 95, etc.). Even if these may be claimed as natives in Britain (which is doubtful), the Halifax parish is surely a most unlikely area to produce them as such. In an area of this kind all species which maintain their existence only in ground specially prepared for them by man, competition by other plants being prevented, should be regarded with great suspicion, and we regret the authors have not adhered more rigidly to this rule, especially when the point of view is that of plant associations, for we believe that an important feature of this method of study will be to enable us to distinguish more clearly than we have hitherto done natives from species of lower grades of citizenship. It is a distinct loss to British botany that this method was not adopted generations ago when, in 1836, H. C. Watson* advocated the making of vegetation maps as distinct from maps showing the distribution of orders or species. Unfortunately his suggestions were not acted upon, and the paper seems to have been almost forgotten or unknown. After a lapse of nearly 70 years the method was applied in Scotland and now in England. Better late than never.

We should like to have seen a vegetation map included in this flora. The use of signs as suggested by Watson would have been both effective and inexpensive.

One feature brought out in this area is the fact that the moors, to a great extent, are occupied by cotton grass. As they point out, the popular belief is that a moor is a rolling stretch of heather, though, in fact, on many extensive moors, pre-eminently in Halifax, heather is conspicuous by its absence, a feature which was first called attention to by Mr. C. E. Moss. Curiously enough, although this work furnishes abundant evidence that the flora of the parish has undergone considerable changes, it does not seem to have occurred to the authors to inquire more deeply into this old and popular belief, and consider the very strong evidence that exists that our present cotton-grass moors have developed enormously in extent within quite recent years, and also the fact that, in adjacent areas at any rate, they are going back again to their earlier condition. We are glad to learn that cotton-grass is not a grass, but a sedge. We suppose this is a set-off

* 'Observations on the Construction of Maps for illustrating the Distribution of Plants.' Hewett C. Watson, *Mag. Nat. Hist.*, 1836, p. 17.

against those ecologists who so often remind us that 'our moors are grass moors.'

The woodlands are divided in a very suggestive manner into mixed deciduous woods, dry oak woods, and clough vegetation, and the plants of the undergrowth compared in a most interesting manner.

The historical and biographical sketches furnish interesting reading, and the early workers are given their full due. Bolton deservedly occupies a high position, his 'life-work stands well the test of time it justifies the unstinted admiration of us who reap what he has sown.' A curious omission occurs here. The authors state carefully the place of publication of each of Bolton's works, except when dealing with his 'Fungusses,' and then omit all reference to the fact that the work was printed locally, at any rate within two miles of the parish boundary.

In the list of species few points call for comment. The unnecessary comma after the specific name has been adopted throughout. The 'common' names are rarely so in any real sense, but chiefly book names. The census number, citizenship, and Watsonian type are given. We should very much like to have seen this principle carried further. It is clear to all who have studied plant associations, that not only have we the large associations but many, often well-defined sub-associations, and there was an opportunity here of carrying the problem of distribution a step further. We look in vain, in the body of the work, for indications of the common associates of the species; perhaps this is expecting too much in the present state of knowledge, but we should like to have seen a closer connection between the ideas expressed in the introduction and the details of distribution given of the species in the Flora. A serious obstacle in the way, however, is the lack of definite terms for such associations; in this respect ecology is deplorably weak, but it would be a great advance if we were able to indicate in convenient terms the associations to which the several species belong. The compound names in use are too cumbrous and can only be provisional.

The habitats, however, have received careful attention and are often very suggestively stated. Occasionally we meet with a startling statement as in the Hair-grass (*D. flexuosa*) found 'chiefly on the damper moors.' Smith and Moss give it as a dominant plant of the dry grass heath, and this agrees with the experience of most botanists; certainly it is ours.

We much regret that little or no reference is made to altitudinal range. In many cases this could have been done with real profit, and keeping in mind the association idea have traced the species in their descending or ascending range, noting especially the altitude and other conditions of maximum development. Here and there, without obvious purpose, a reference is made to altitude as in the case of the Bracken 'ascending to 1200 feet.' If this is the limit, it contrasts unfavourably with moorlands abutting on the parish, where it reaches often 1650 feet.

Misprints, other than those indicated in the errata, are few; the specific name of the Cowberry, however, looks curious beginning with a Y.

Very little attention appears to have been given to critical species and varieties; an interesting problem presented itself here to work out some of these at any rate in detail with special reference to habitat.

The second half of the Flora is by Mr. C. Crossland, and contains remarkably long lists of species of the lower cryptogams. Mosses and Hepatics 320, Lichens 95, Algæ 212, and Fungi 1225. We know of no other local flora so well worked in these departments, and it is in this part of the work that the greatest number of additions have been made to previous records. The list of algæ is based largely on Wests' 'Alga Flora of Yorkshire,' the remaining groups have been worked up by local botanists in a most praiseworthy manner. In this connection the name of Mr. James Needham stands out prominently. In the list of fungi especially every page, almost every line, testifies to his industry. He has examined almost every inch of ground in many areas, and a large number of inconspicuous forms have rewarded his search. Since 1889 thirteen species of fungi new to science and twenty-three new to Britain have been discovered in the parish. The list, however, suffers from excessive condensation and the too free use of contractions; 'Cwl. Wd.,' 'Mdgh.,' and many others might be readily understood by those familiar with the parish, but are certainly puzzling to others, and too much reference to an index is trying.

The type and get up of the book leave nothing to be desired.

The Flora as a whole is a worthy outcome of a long line of active and able workers, and we hope it will serve as a new starting point for still more vigorous work in the future.



WHITBY ABBEY FROM THE CLIFFS.

Yorkshire: Coast and Moorland Scenes. Painted and Described by **Gordon Home.** A. & C. Black, London, 1904. 7s. 6d. net.

Although many beautifully-illustrated works dealing with our broad-acred shire have appeared in recent years, but few can compare with the new book just issued by Messrs. Black, and the volume certainly stands alone in giving a vivid impression of our coast and moors in colour. Strictly speaking, the title of the book is hardly correct, as it deals principally with the North Riding only—Pickering, Scarborough, Whitby, Rievaulx, and the intervening districts. The area, however, is dealt with in an able and entertaining manner, and includes various items of interest to Yorkshire naturalists. Occasionally the author has obtained quaint references from old works, such as the description of the ‘Sea Man,’ caught by the Skinningrove fishermen in 1535. This raw-fish eating monster, which eventually escaped and went back to the sea, had evidently something human about him, as we learn that, when there were any ‘fayre maydes’ amongst his numerous visitors, he would gaze at them with a very earnest countenance, ‘as if his phlegmaticke breaste had been touched with a spark of love’! We also gather that formerly certain rocks towards Huntcliffe Nab, left bare at low tide, were covered with ‘Seales in greate Heardes like Swine,’ and reference is made to the fact that ‘One Great Seale or more keepes sentinell, which, upon the first inklinge of any danger, giveth the Alarme to the rest by throweing of Stones, or making a noise in the water, when he tumbles down from the Rocke, the rest immediately doe the like, insomuch that yt is very hard to overtake them by cunning.’ In view of the recent frequent record of Seals on the Yorkshire coast this reference is not without interest.

But it is in the 32 coloured reproductions of water-colour drawings of coast and moorland scenery that the real charm of the book lies. To some the colouring of these may seem rather high, but it must be remembered that in them the country is seen ‘under summer skies, in the late autumn, when the richest of tints are on the foliage, and in the winter, when sea and moor are swept by fierce winds.’ And if the actual browns of the bracken, the purple of the heather, and the various tints of foliage, rock, and sea do not appeal to us so forcibly as they have done to the artist, we can only regret that we have not his eyes. By the courtesy of the publishers we are able to reproduce one of the illustrations herewith (Plate VI.).

NORTHERN NEWS.

Mr. J. Whitaker describes a Kestrel laying in an artificial nesting-box at Rainworth Lodge, Notts. ('Zoologist,' May 1904).

At a recent meeting of the Lancashire and Cheshire Entomological Society, Mr. C. E. Scott exhibited a specimen of *Periplaneta australasiae*, a Cockroach which has become naturalised at Worsley, Lancashire.

The Leicester Literary and Philosophical Society held an excursion to Whitby from 20th May to 25th May. In connection with this a useful pamphlet on the geology of the district has been prepared by Mr. C. Fox-Strangways.

In the report of the Committee of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne for 1902-3 a substantial increase of members is recorded. No fewer than 111 new members joined during the year, leaving the present membership 327.

At a recent meeting of the Whitby Urban Council it was suggested that the Council should consider the advisability of advertising the fact that Prof. J. J. Thompson had discovered that the sands at Whitby were more strongly radio-active than at any other place in England.

It is very gratifying to note the practical interest that is being shown in botanical survey work. The Royal Society has just awarded a grant to Mr. W. M. Rankin, B.Sc., late of Leeds, for the survey of Hampshire and for his contribution to the survey of the West Riding of Yorkshire.

Readers of the 'Naturalist' will be interested to learn that the University of London have granted the degree of D.Sc. to Mr. F. Cavers, late of the Yorkshire College, now at Plymouth, for his work on the Hepaticæ, and that the Royal Society have given him a grant of £25 towards his investigations of these plants.

The Rev. E. A. Woodruffe Peacock, Cadney, informs us that in a letter written to him last year by the late S. H. Hudson it was stated that *Nisionades semiargus* was not extinct. Mr. Peacock is anxious to know the exact locality for this species, and would supply the six inch map to anyone who knows, in order that the locality may be recorded thereon, or he would gladly join any lepidopterist who knows the locality in an excursion.

At the recent annual meeting of the Ripon Naturalists' Club, the secretary, Mr. B. M. Smith, gave an account of the history of the society. It dates back to 1882, when the then secretary of the Yorkshire Naturalists' Union supplied two Ripon workers with a list of other naturalists in the district, and the society came into existence. The society is now relieved of its financial anxiety, and has a balance in hand. Its museum is in the possession of the Ripon City Council.

Included in the Duke of Norfolk's wedding gift to Sheffield of a 48-acre open space at Wincobank, is an ancient encampment, which is generally considered to be of pre-Roman date. An effort is being made to get this fenced in and preserved, and Mr. E. Howarth, Curator of the Sheffield Museum, suggests that a model of the earthworks should be prepared. Objects of archæological interest are not very numerous near Sheffield, and it is to be hoped that something will be done in the desired direction.

Mr. Percy F. Kendall, F.G.S., who has been Lecturer in Geology at the Yorkshire College since October 1891, has been appointed to the Professorship of Geology in the University. Mr. Kendall formerly studied at the Royal School of Mines, and was subsequently elected to the Bishop Berkeley Fellowship at the Owens College, Manchester. He is well known as an active contributor to the literature of geology, especially relating to Yorkshire, and he has recently been invited by the Geological Section of the Royal Coal Commission to report upon the concealed portion of the York, Derby, and Nottingham coalfield.

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Past-President of the Yorkshire Naturalists' Union, etc.

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NOTES AND COMMENTS.

A BRADFORD NATURALIST AND HIS WORK.

The Royal Society has just made a grant, for the fourth year in succession, to Mr. W. West, F.L.S., to aid him in his researches amongst the freshwater algæ. Mr. West is a prominent member of the Yorkshire Naturalists' Union, and a few years ago occupied the presidential chair. In conjunction with his son (Prof. G. S. West) he in 1901 completed the 'Alga Flora of Yorkshire,' which enumerated over 1,000 species. The Royal Irish Academy has awarded him a grant, for the third time, to aid him in his investigations of the algæ of the coast of Ireland. In addition to working material for the British Museum and numerous other institutions, Mr. West and his son are at the present time engaged in preparing a monograph on the British Desmidiaceæ for the Royal Society, towards which £1,500 has been put aside for the purpose of reproducing Mr. West's drawings. Over 1,000 species and varieties will be described in this work. We trust that Mr. West will long be spared to carry on the most useful work he is engaged in, and in connection with which he has already done so much.

ANOTHER LOCAL PUBLICATION.

'Ring out the old, ring in the new!' We recently referred in these columns (p. 129) to the death of a useful publication, the 'Halifax Naturalist,' after eight years' career. Early in July No. 1 of the 'Bradford Scientific Journal' made its appearance. In a somewhat lengthy 'apology' reasons are given for the existence of this new journal. The venture 'is not a commercial one, and the usual fanfaronade about cheapness and circulation may therefore be dispensed with.' Science in all its branches will be dealt with. On account of the former 'tremendous glacial *activity*' in the district, Bradford is favourably situated from a geological standpoint. The editors will encourage the study of Nature in all its ways save one, 'that of mere collecting,' which we submit is no more studying Nature than is collecting buttons or bricks. Still, the first number augurs well. Mr. J. E. Wilson starts the ball a-rolling with 'The Glacial Lakes of the Bradford District,' in which the work of Carvell (sic) Lewis, Kendall, Muff, and Jowett is duly acknowledged; Mr. E. Naylor writes on 'The Bradford Botanical Garden,' Mr. E. Harper gives 'A Study in Rooks,' with a map

of the Rook roosts around Bradford. There are other notes, some of local interest, but others, whilst interesting in their way, have no local bearing whatever, and unless the 'Bradford Scientific Journal' is going to appear as a scientific 'Tit-Bits,' these should be rigidly excluded. The publication is to appear quarterly, at 6d., and we can only hope that our Bradford scientific friends will be able to keep the paper going as long as did the Halifax naturalists theirs. There is a strong editorial staff, amongst which, however, we notice some unexpected omissions. In Part 2 a little more care should be taken with the proof-reading.

THE SOIL STOREHOUSE.

REV. E. A. WOODRUFFE PEACOCK, F.L.S., F.G.S.,

Cadney, Brigg.

It has long been known that the blanket of soil which covers the surface of the earth in temperate lands, can bury and preserve for an indefinite time any durable articles which may chance to find a resting place on the ground. It is not so generally recognised, however, how common and rich such deposits are in spots which have long been inhabited and 'turfed' to the doors. These old 'home-places,' still green with the original sod, are scattered irregularly throughout the whole country. All are not stored with equally interesting memorials of the past. Even in the oldest pasture lands of richly endowed neighbourhoods, the quality of the soil records varies greatly in human interest.

Regarded merely as a storehouse of evidences of man's occupation, the soil may be defined as the humic stained regolith or rock-blanket, made conjointly by natural weathering and the vital actions of animals and plants. There is no difference in the black earth of soils formed from the varying rocks of the earth's crust, when it is merely considered as the means and vehicle of preservation. The dark colour of a damp soil is derived directly from plants' decay; and the earthworms, as Darwin long ago pointed out, are the great soil makers. The moles and field mice, and every species of burrowing insect help on the work, aided by billions of bacteria in every square yard of the ground. For such mighty results the means seem trifling, but when sufficient time is allowed the most insignificant causes

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produce grand effects. Soils six feet in depth are not uncommon in wind-sheltered spots. Allowing the average time, five inches as the growth of 40 years, 580 years would make such a soil *de novo*. From a few inches to two feet is the depth of soils, speaking generally. The worms pile up the earth from below ground around, and finally above all objects they cannot remove. This action lets them sink into the soil by the force of gravity, as the earth is removed from below. The double movement of sinking and burial is so complicated, that only a third of the motion downwards can be regarded as directly caused by gravity. In pasture and meadow soil the burial is so steady and continuous that it can be easily watched during the lifetime of an ordinary individual. A round pebble, three inches in diameter, disappears below the surface of rich pasture, and is grassed over in 25 years. In very rich feeding land, with a large supply of worms (60,000 to the acre at least), 18 years is all the time that is required. The same gradual sinking goes on at a uniform rate after the object is lost to view, till it reaches the bottom of the humic earth, and comes to rest on the rock bed, be it sand, clay, or the broken fragments of a stony bed.

Tilth, unlike pasture, from being constantly ploughed up has its upper levels mixed over and over again. It is rarely found to contain much of interest. The work of burial cannot go forward with the share ever revealing what lies between the surface and the plough-sole, as it is technically called. It is only a question of time in shallow soils, where the plough-sole frequently catches the mother rock, before any object of interest is turned out on the surface, and the ploughman views and appropriates it. The exceptional cases are deep, arable soils like silt, in which the share only enters the upper portion of the humic earth. No burial during annual cultivation can still be going on in such deep soils, but whatever was safely hidden away below the plough-sole line before the soil was first tilled is still there.

Where old pasture and meadow, or deep arable soils, such as we find round our villages, are opened for drainage or any other purpose, a sharp watch should be kept on the line between the black soil and its lighter coloured mother rock. Speaking generally, little of interest for the antiquary or historian will be found in the soil itself, where for the student of agriculture as a science there is everything to learn. The methods and periods at which the turf has been dressed to make it more fruitful, will be exhibited at a less or greater depth according to

age. Pottery of the late Victorian era lying at the same level with ashes and other refuse, shows a kitchen midden origin. Other lines, quite as distinct, may show the lime, burnt clay, and bone fragments, once so deservedly popular with our agricultural forefathers. There can be no mistaking such dressings when they have once been observed, and if the date when any substance was applied can be obtained for certain, the burial rate of that particular soil is known.

If a neighbourhood has long been 'an inhabited spot,' at the boundary line between the black earth and subsoil or rock bed, the accumulated records of other ages lie side by side, and not unfrequently resting one on another. In one trench, and on the same line, but not exactly at the same depth, for that depends on the surface contour, may be found prehistoric stone implements, with the tusks of the wild boar, horses' teeth, and those of lesser animals, along with coins of the earliest period to those of George the Third. A British bronze buckle is not wide apart from a wrist-guard of some ancient bowman, and a spindle whorl of some diligent house-mother; a large bullet of much more recent date, and an iron hay-fork, with a tang for driving into the shaft, not a socket into which the shaft fits, as forks are made nowadays.

The long-neglected quernstone may be found overlying fragmentary pottery of a period too remote to fix a certain date, with later pieces of domestic earthenware above them, which as plainly declare their age and origin as any china of to-day. Gold, silver, and bronze coins are rare or common according to the value of the metal. Old iron implements in a fair state of preservation are rare; much seems to depend on the soil they are buried in. When found iron tools are often only too much like the bones of men and the lesser animals, in too advanced a state of decay to reveal their secrets or use. The teeth can outlast for long the jaw that grew them, as the iron does the wood shaft. Were the climate drier, or had the bones been buried at a greater depth, and away from the action of humic earth, they would have lasted ages longer. Damp can largely account for the few bones we possess of prehistoric man.

The nearer a soil investigation approaches the house-place of the present or of a bygone age, the more frequent relics of scientific value become. Our forebearers over 2,000 years ago were as keen and far-seeing as people of to-day, if not scientifically so well fitted for the battle of existence. They fixed their home-places on or near the richest soils a neighbourhood

supplied. Their houses were on the driest spots, their camps on elevated positions from which distant views could be obtained. The hands which could fashion and use the huge paleolith and chip the tiny flint arrow, with its two barbs and tail, which a sixpence can wholly cover, were as capable as ours are to-day. The man of the past knew the rich soils from the poorer, the feeding or holding turf from the barren dunes. Perforce, with the country more than half covered with thick or open woods, their power of selection was not the same as ours in a colony with open, rolling, treeless plains like the States or South Africa, but they did know and select the good soil, the clear and continuous spring, and sheltered spot for their homes. As race has followed race in the stream of conquest, ages before and ever since the Roman occupation, the same village site or its immediate neighbourhood has been used over and over again; till, at last, through the lapse of time alone, the soil has become a perfect storehouse of the history and civilisation of the people who followed one another, as occupiers of the spot.

There is no confusion of materials in a fairly deep arable soil, or under old pasture and meadow land, even when they show 'plough lines,' unless the ground has been opened and levelled again by man. This is very often the case round villages and small towns, and is practically always found to be so in and around ancient cities like Lincoln and York. Where camps have been stationed for a long time, or fortifications have been thrown up, the soil records are much mixed and become difficult to decipher. By careful observation, however, 'broken ground' can always be detected from an unmoved soil lying on its mother-rock. The wall or vallum reveals the fact whether it were stockaded or not, if trenches are cut across its surface in a few places. The post-holes can be seen at once when the signs are known.* The ditch of the fortress is not quite so easy a matter, and much trench digging is required if all the facts about it are to be ascertained. The water line, if there ever was one, may be discovered by care in noting the presence or absence of shells, seeds, and drift-wrack. Where the larger land shells are most frequently found mixed with a few water species, the drift line of the water most certainly came. The ditch may have been waterless for a long period, and have been levelled by the action of time and human agency; it may even have been built

* Post-holes of British date have been detected by Mr. J. R. Mortimer in barrows on the Yorkshire wolds, plaster casts of which are preserved in the Driffield Museum.—EDS.

over, but nothing can truly obliterate it, and if trenches are cut across it where its original outline is intact, though hidden or disguised, there can be no mistaking its former width, depth, and water line.

There is, however, one notable exception to the rule that no confusion or mixing of periods is found in the soil as produced by nature. Sand dunes, whether seaside or inland, exhibit most marvellous cases of type mixing. This is specially the case with sandhills gathered together on a slope facing the west or south-west. With an uncertain fickleness the wind cuts away what it piled up ages ago or yesterday, and mixes the whole again in inconceivable confusion. In one case on Manton Warren we found neoliths and British and Roman pottery buried in sand four feet above fragments of soda water bottles, a broken plate, and drinking horn of the last ten years. A sou'wester had cut through an old drift with a narrow and steep-sided gulley, into which a picnic party had slipped and broken the contents of their basket. The upper black soil which they had carried down in their fall was easily distinguished. A fresh blow from the south-west, from a slightly different point, buried the gully in places six feet deep, by drifting in one side and blowing away the light sand from the other.

As a rule æolian action can always be detected. Where it has gone on for ages it is still shaping the configuration of the land, unless the soil has been planted with trees, or shelter belts have been judiciously drawn across the country. Sand found on western escarpments may always be looked upon as suspicious or doubtful, and the slightest mixture of contents reveals its origin.

Wherever old soil is being opened, men with antiquarian and scientific tastes should keep a sharp look out for finds. Over and over again most invaluable data have been overlooked or lost. As an illustration, the following fact, related to me by Dr. Marten Parry, of Spalding, may be quoted:—In improvements made some years ago at that place, earth was carted away and spread as a top dressing on three different fields in the parish. Numbers of coins have been turning up in this redeposited earth ever since. There can be little doubt that without being observed an interesting hoard of ancient Roman money was disturbed and distributed over a wide area. From the regular dispersal through the whole mass of soil removed, it almost seems as if this were not the first time that these coins had been passed over by unobservant eyes.

YORKSHIRE COLEOPTERA IN 1903.

M. LAWSON THOMPSON, F.E.S.,

Hon. Secretary Yorkshire Coleoptera Committee.

THE continuation throughout the season 1903 of weather most unfavourable for collecting has left coleopterists with but little to report. Here and there, however, a few really interesting insects have been met with, as the list given below will show. The attendance of members of the committee at the meetings of the Yorkshire Naturalists' Union was a record one, especially at Filey, where the workers in this branch of entomology were never before so well represented. Sixty-five species of coleoptera were met with on this occasion (see 'The Naturalist' for 1903, p. 246). At the Goathland meeting Mr. H. Ostheide and I found this upland district a good one for beetles, and with the assistance of Mr. J. T. Sewell sixty-six were noted, one of them—*Donacia discolor*—being new to the county (see 'The Naturalist' for 1903, p. 302). Nothing was done at the Cowthorpe meeting, the day being too wet. At Bowes Mr. A. G. Robertshaw found a few common beetles ('The Naturalist' for 1903, p. 355), whilst Messrs. E. G. Bayford and others reported meeting with eight species at Wharnccliffe, including *Cryptophagus lycoperdi* ('The Naturalist' for 1903, p. 399).

Mr. H. H. Corbett has again been working in the neighbourhood of Doncaster, and Mr. J. W. Carter has sent some interesting notes on his observations in the Bradford district.

To the 'Transactions of the Hull Scientific and Field Naturalists' Club' for the year 1903 (Vol. III., No. 1), Messrs. T. Stainforth and H. E. Johnson have contributed a 'Third List of East Yorkshire Coleoptera.' In this a number of scattered records of localities for about two hundred species found in this part of the county have been brought together.

Mr. J. W. Carter, F.E.S., has published in 'The Naturalist' for May of the present year (pp. 148-150) an account of the observations made by himself and others on some *Adephaga*. It is entitled 'Some Yorkshire Coleoptera—(Adephaga),' and enumerates thirty species, with notes, met with chiefly on moorland tracts in the neighbourhood of Bradford.

The following notes are from information kindly furnished by members of the committee for this report. The species marked with an asterisk have not, so far as I can learn, been previously recorded for Yorkshire. H.H.C. = H. H. Corbett; J.W.C. = J. W. Carter; M.L.T. = M. L. Thompson.

ANCHOMENUS ERICETI Panz. Hatfield Chace (H.H.C.).

AGABUS ULIGINOSUS L. Hatfield Chace (H.H.C.).

- RHANTUS BISTRIATUS Berg. Hatfield Chace (H.H.C.).
- *ACILIUS FASCIATUS DeG. (CANALICULATUS Nic.). Hatfield Chace (H.H.C.).
- *HYDROPHILUS PICEUS L. In a note on 'Beetles in Peat' in 'The Naturalist' for 1903 (pp. 407-408), Mr. E. G. Bayford records the finding by Mr. G. Darley of an almost complete skeleton of this species under the peat at Hatfield Chace.
- OCTHEBIUS RUFIMARGINATUS Steph. In a pond at Saltburn, May (M.L.T.).
- TACHINUS PALLIPES Grav. In decaying fungi in Saltburn Wood, September (M.L.T.).
- MEGACRONUS INCLINANS Grav. In decaying fungi in Saltburn Wood; one specimen in September (M.L.T.).
- QUEDIUS LATERALIS Grav. In decaying fungi in Saltburn Wood; common in September (M.L.T.). Near Doncaster (H.H.C.).
- QUEDIUS TRISTIS Grav. Rombalds Moor (J.W.C.).
- STAPHYLINUS STERCORARIUS Ol. In a nest of *Fermica rufa* near West Ayton in August (W. C. Hey).
- LATHROBIUM ELONGATUM L. On Harden Moor, near Bradford (J.W.C.).
- *STENUS ATER Mann. Saltaire, near Bradford (J.W.C.).
- DELEASTER DICHROUS Grav. Eight or nine specimens on the banks of the Greta at Burton-in-Lonsdale (J.W.C.).
- *LESTEVA SHARPI Rye. Saltaire (J.W.C.).
- PHLÆOHARIS SUBTILISSIMA Mann. Thorne (H.H.C.).
- NECRODES LITTORALIS L. Rossington, near Doncaster (H.H.C.).
- CHOLEVA GRANDICOLLIS Er. On the moor at Kildale-in-Cleveland, in a dead hedgehog, August (M.L.T.).
- HYPERASPIS REPPENSIS Herbst. Wheatley Wood, near Doncaster (H.H.C.).
- BYRRHUS FASCIATUS F. Hatfield Chace (H.H.C.).
- *THROSCUS CARINIFRONS Bonv. Barden, near Bradford (J.W.C.).
- CORYMBITES ÆNEUS L. Doncaster (H.H.C.).
- PYROPTERUS AFFINIS Payk. Mr. H. V. Corbett records the occurrence of this interesting species in Wheatley Wood in July, 'close to the same spot where Mr. Bayford took the larva of the same insect some years ago.' (See 'The Naturalist' for 1903, p. 407.)
- ANCYSTRONYCHA ABDOMINALIS F. Ingleton (J.W.C.).
- PADABRUS ALPINUS Payk. Wheatley Wood (H.H.C.).
- RHAGONYCHA FUSCICORNIS Ol. Saltburn, in July (M.L.T.).
- MALTHODES FLAVOGUTTATUS Fries. Grassington (J.W.C.).
- *MALTHODES PELLUCIDUS Fries. Grassington (J.W.C.).
- MALTHODES ATOMUS Thoms. Kilton Wood, near Saltburn (M.L.T.).
- RHAGIUM INQUISITOR F. At Armthorpe, near Doncaster (H.H.C.).
- POGONOCHELUS BIDENTATUS Thoms. Wadworth, near Doncaster (H.H.C.).
- TETROPS PRÆUSTA L. Wheatley Wood (H.H.C.).
- ORSODACNA CERASI L. Edlington Wood, near Doncaster (H.H.C.).
- *DONACIA DISCOLOR Panz. (COMARI Suffr.). Mr. H. Ostheide found this species in Fen Bogs on the occasion of the Goathland meeting. The insect was not recognised as *discolor* until some time after.
- LONGITARSUS ANCHUSÆ Payk. Saltburn (M.L.T.).
- HALTICA OLERACEA L. Saltburn (M.L.T.).
- CREPIDODERA SMARAGDINA Foudr. On sallows in Kilton Wood, near Saltburn (M.L.T.).
- TETRATOMA FUNGORUM F. Finningley, near Doncaster (H.H.C.).
- *CEUTHORRHYNCHIDIUS QUERCICOLA Payk. (VERSICOLOR Bris.). Wheatley Wood in June (H.H.C.).
- *RHINOCUS GRAMINEUS Herbst. (INCONSPICUUS Auct.). Wheatley Wood in August (H.H.C.).
- *BALANINUS VILLOSUS F. Wheatley Wood in April (H.H.C.).

YORKSHIRE NATURALISTS AT SPURN.

THE 181st meeting of the Yorkshire Naturalists' Union was held at Spurn, one of the newest, but, at the same time, one of the most interesting localities in the British Isles. The Spurn peninsula is, geologically speaking, quite of modern date, and as its position is by no means permanent, and its bearing on the lost towns of the Humber is somewhat interesting, the question of its former site was one of many the members attempted to solve. Whether they did so or not is another story. Between 30 and 40 members took part in the Saturday's excursion, and the photographers were successful in securing several good natural history photographs.

As may be seen on reference to previous reports on the Spurn area,* the district is one of exceptional interest from a natural history point of view.

In the present instance the members were largely archæologically inclined, and the recent discovery of Roman remains in the Kilnsea area attracted a good deal of attention, and several objects of Roman date were unearthed. Mr. J. W. Webster, of Easington, exhibited some of this character which he had recently discovered.

The geologists, under the leadership of Mr. J. W. Stather, F.G.S., examined the glacial sections between Dimlington and Kilnsea, and amongst the specimens secured were two fine mammoth teeth, which, however, were obtained by a 'silver hammer.'

On Saturday evening, Mr. A. H. Pawson, F.L.S., presided over a largely-attended meeting at the Queen's Hotel, Withernsea, at which the following papers were given:—

- (1) 'The Sea's Encroachment on the East Coast,' by Mr. R. G. Allanson-Winn, M.I.C.E.I. (Dublin).
- (2) 'A Few Notes on Spurn Point,' by Mr. A. E. Butterfield.
- (3) 'The Real Ravenser,' by Mr. T. Blashill, F.R.I.B.A.
- (4) 'Roman Remains at Kilnsea,' by Mr. T. Sheppard, F.G.S.

These had attracted considerable interest, and many local antiquaries and geologists took part in the discussion which followed and lasted until a late hour. Some of these papers will shortly appear in 'The Naturalist.' At this meeting the usual reports of excursions were read and several new members were elected, and votes of thanks were passed to the leaders, land-owner, and local secretary for their assistance. Some of the reports presented appear below.

* 'The Naturalist,' August and November 1884.

On the following date the party continued its investigations in the Spurn district, and on Monday, whilst some were called away to business, others appeared upon the scene, the party breaking up on Monday evening.

For the Vertebrate Section Mr. Riley Fortune reports :—The chief object of the ornithologists was to visit the colonies of Lesser Tern and Ringed Plover which exist upon the shingly beach of Spurn (Plate X.). It was satisfactory to find that fair



Photo by]

The Thrushes' Slaughter Stone, Spurn Head. [*Godfrey Bingley.*

numbers of both species still manage to exist, and that the nesting season has been more favourable than that of last year, when most of the eggs were destroyed by the high tides.

The two species are found nesting along practically the whole length of the beach, but the main colony of terns appears to be located at the Point proper. Nests of both were found with eggs, far advanced in incubation, and young birds, some just hatched, were also seen. Most of the eggs had been hatched, but there were evidences, despite the protection

Naturalist



Photo by]

Nest and Eggs of Lesser Tern.

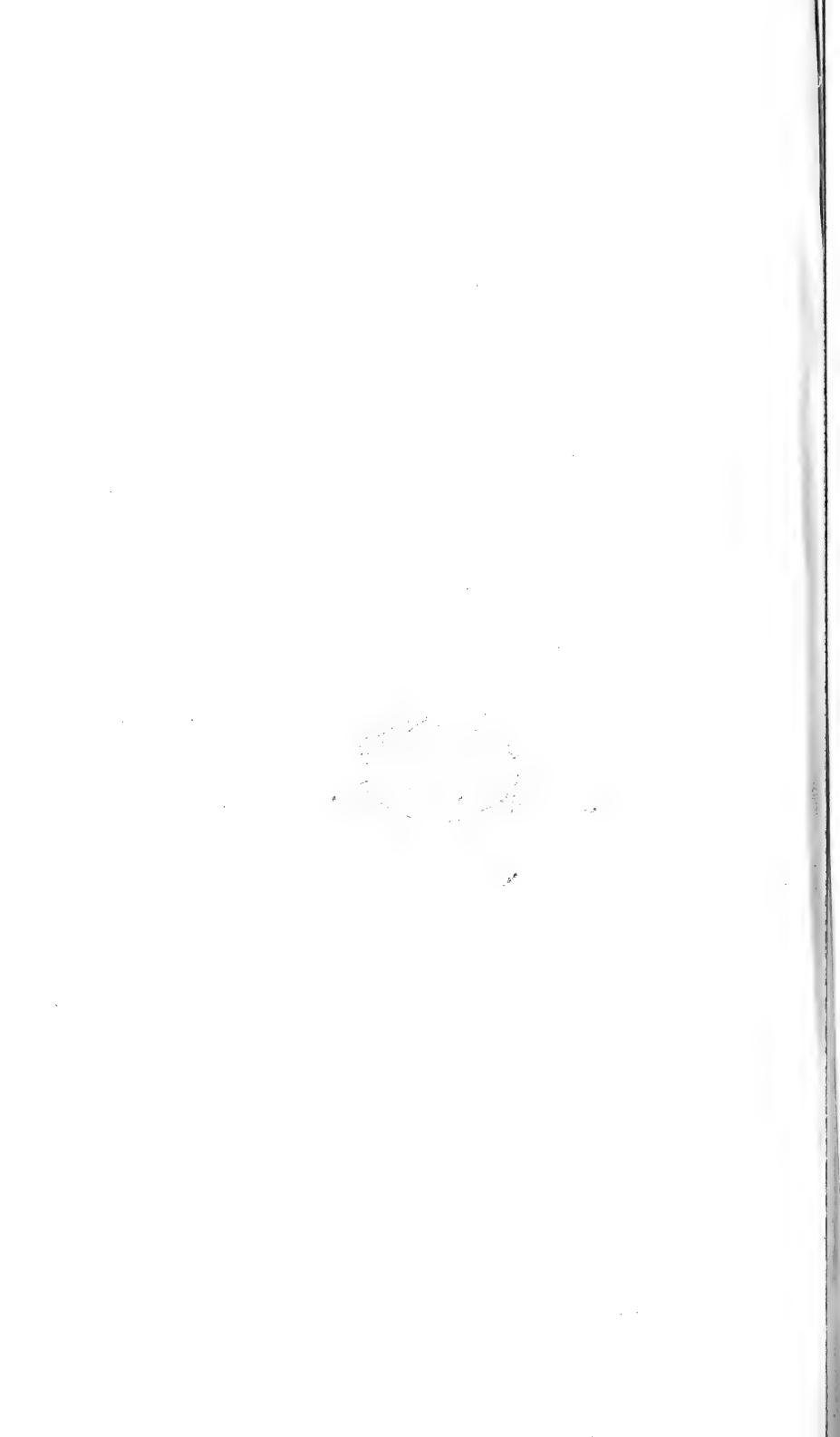
[R. Fortune.

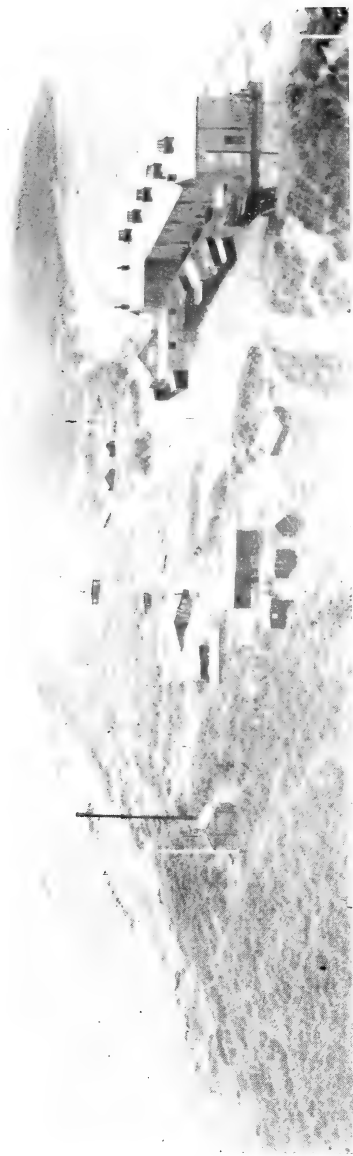


Photo by]

Nest and Eggs of Ringed Plover.

[R. Fortune.





[*Godfrey Bingley.*]

Spurn Head from Lighthouse, looking Southwards.

Photo 6v.]



afforded, that many had been taken. This is greatly to be regretted. It seems almost impossible to adequately protect rare breeding species in Yorkshire from the greed of the egg collector.

Shelducks had nested among the sandhills; none were, however, seen during our visit.

Several Thrushes' 'altars' were seen, some of them surrounded by heaps of broken snail shells, chiefly *Helix aspersa* and *H. arbustorum*. I do not remember having previously seen any places so much used for this purpose. One of these, taken by Mr. Godfrey Bingley, is here reproduced.

Altogether 45 species of birds were seen, none of which, except the two mentioned above, call for special mention. Two mammals, several Common Lizards, and one amphibian complete the total of vertebrates noted.

A month later would have been a better time for a visit, from the ornithologist's point of view, as we missed the hosts of waders and other migrants which frequent this locality a little later in the season.*

The conchologists, under the Rev. E. P. Blackburn and Mr. W. Denison Roebuck, proceeded as far as Kilnsea by trap and thoroughly enjoyed the drive. Mr. Blackburn writes:—Proceeding down the road to the warren, we carefully sought under stones and wood and in bank for signs of slugs or snails. Our search was rewarded by finding ants, who are foes to mollusca, esteeming them, like the gourmands of France, a great delicacy. One good find one of the ladies made was a *Helix hortensis*, a new record for this part. On entering the warren some *Helicella caperata* cheered our drooping spirits. We had not been there very long before a thunder shower burst upon us, and we had to take refuge in a house near by. The storm cleared presently and we made for the shore, where, in the mud pools, we found *Paludestrina stagnalis* in abundance and *Littorina rudis* and *littorea* alive and flourishing. Thrown up on the beach were dead specimens of *Cardium edule*, *Mytilus edule*, *Macoma balthica* (in two varieties), *Buccinum undatum*, *Purpura lapillus*, *Ostrea edulis*, and *Lutraria elliptica*. Many of these Mr. Petch has taken alive previously, as per circular list, on the sea shore. A single valve of *Volsella modiolus* was taken. Leaving the shore after a short time we came back to the warren and the bent grass which, previous to the storm, proved

* Mr. Fortune has kindly supplied the two illustrations of nests of the Tern and Ringed Plover reproduced herewith (Plate X.).

barren, but now was alive with *Helix nemoralis* and *aspersa*, both beautifully banded and marked; some of the specimens having interrupted and cross banding very marked. The specimens were very fine and large, both of *nemoralis* and *aspersa*. Mr. Pawson also took *H. nemoralis* and *aspersa* at Spurn Point, and said the Point swarmed with them.

We found but few *Helicella virgata*, though they are said to abound. One specimen of *Helix hispida* was taken. The only record for slugs was the common *Agriolimax agrestis*, and there were few of these. Returning by road to Easington, the brackish streams yielded plentifully *Paludestrina ventrosa*. The ponds in the neighbourhood of Kilnsea yielded nothing, maybe because there seemed an abundance of good collectors in the shape of geese and ducks. But a small pond about a mile out of Easington, covered with duckweed, yielded *Limnæa peregra*, *Planorbis albus*, and *Sphærium corneum*.

There were several very fine Thrushes' altars, one of which was photographed by Messrs. Fortune and Bingley.

Considering the dryness of the weather for some time and the shortness of the time at our disposal we consider we did very fairly.

For Lepidoptera Dr. E. O. Croft reports:—The conditions were not very favourable for work in this department. Stormy weather on 2nd July and a rather strong breeze on the following two days did not allow of many insects being seen on the wing. Among the butterflies noticed *Lycæna icarus* (*Alexis*) was common and in fine condition; *Hipparchia janira* was abundant, and *H. tithonus* was seen near Easington. In the same district also *H. hyperanthus* was taken. The Common Whites were unusually scarce, a few *Pieris napi* and one *P. Brassicæ* being the only ones seen. Common species of Geometræ were fairly abundant, especially *Melanippe montanata*, which was present in every hedgerow. Larvæ of *Euchelia jacobæ* occurred commonly on ragwort on Kilnsea Warren and near the Spurn Lighthouse, a profusion of the cocoons and recently emerged imagoes of *Zygæna filipendulæ* were noted. Ova and the female imago of *Odonestis potatoaria* were also found on the Spurn. Owing to the distance from headquarters no night collecting was undertaken.

Mr. Ostheide has identified the following species of coleoptera brought by Dr. Croft:—*Creophilus maxillosus* L. and *Necrophorus ruspator* Er. (*investigator* Zett.).

Dr. W. G. Smith writes :—The vegetation from Withernsea to Spurn Point is sharply divided about Kilnsea. Landwards towards Withernsea and Patrington, there is the continuous sheet of boulder-clay. Cultivation occupies most of the area, and the huge clods lying unbroken on the summer fallow show that the land requires skill if it is to be fruitful. Woods are few in number, and except in the hedge-bottoms, one misses the woodland plants. The trees, almost without exception, are wind-swept even at a considerable distance from the coast. They present a characteristic sloping crown, lowest towards the north-east and east, whence evidently come the winds which cut the young twigs down. The boulder-clay cliffs on the North Sea are distinctly disappointing from the botanical outlook. The coast erodes so fast that only a few plants secure a foothold at all.

From Kilnsea to Spurn Point there is a fine region of maritime vegetation. The striking feature is the difference between the seaward side and the Humber side. The former is fairly uniform. The loose sand is caught and fixed by Marram Grass, Sea Couch, and Sand Sedge, and between the tussocks a low undergrowth (which includes many *Leguminosæ*) still further fixes the shifting sand. Here the Sea Holly and *Volvulus Soldanella* play a useful part. On the sand dunes of the Tay (also on the North Sea coast) both have been recorded as rare, but we have failed to find either after many excursions. The relative scarcity of Lyme Grass on Spurn is also noteworthy. The fixed dunes (or links) extensively developed on both sides of the Tay estuary are hardly present on Spurn except round the patches of potatoes and mangold near the lighthouse. Returning by the Humber side one finds plants not recorded on the seaward side. These are plants of silt deposits laid down by salt or brackish water under estuarine conditions. *Zostera*—almost unique as a ‘flowering-plant seaweed’—is abundant on the wet mud. *Suaeda* and *Salicornia*, with several species of *Atriplex*, are conspicuous on drier mud-flats. If the eroding boulder-clay cliffs were lacking in interest, the part played by plants in building up the Spurn is full of interest. The rolling sand-dunes are built up and held together by sand-binding plants ; in places where this was not enough to prevent breaching man has substituted erections of brushwood. The level mud-flats have also their binders. The author of the ‘Flora of the East Riding’ has already drawn attention to the work of an alga (*Vaucheria*), *Zostera*, and other plants in this direction, and how the reclaim-

ing of land is brought about. In the direction of Botanical Survey we hope that the future will bring forth a botanical map of the Spurn, constructed on a large scale and accompanied by a descriptive paper. Still further in the future this would be a record of great importance.

YORKSHIRE NATURALISTS AT FARNLEY.

It occasionally happens that local conditions, aided by the art of man, result in some of the most perfect of Nature's beauty spots being situated in close proximity to the busiest of manufacturing cities. Such an instance occurs at Farnley, the residence of Mr. A. H. Pawson, J.P., the President of the Yorkshire Naturalists' Union. In his extensive grounds are gathered together the most interesting of British wild plants,



The Alpine Border.

together with many rare Alpine forms, etc. These, aided by rockeries and artificial bog, have been allowed to grow freely, and exist in a state of luxuriance that could hardly be anticipated.

When, in addition to the above, there is fine weather, such as has rarely been experienced in recent years, it will be understood that the President's garden party at his residence, on 16th July, was most successful, and was largely attended by the members of the Union. About 150 members were conveyed by wagonette to Lawns House, Farnley, and, thanks to the care with which all the arrangements had been made, an ideal afternoon was spent. The gardens attracted principal attention,

Naturalist,

though entertainment in every possible form was provided. One particularly pleasant feature, however, was the great number of the older members of the Union who were present, and the opportunity thus offered of having a chat on various matters was most welcome, and taken full advantage of.

Tea was kindly provided in a large marquee in the grounds, after which a vote of thanks was unanimously passed to the President and Mrs. Pawson for their hospitality. A brief business meeting followed, then more time was spent in the grounds, the members taking their departure at a late hour. Representatives from most of the societies in the Union were present, and the general opinion was that on 16th July was held one of the most pleasant meetings the Union has ever had.



Shrubberies by the Dovecote.

The excursions were entirely within the city boundary and were very successful.

There was a party of naturalists, about a dozen in number, under the guidance of the veteran Leeds botanist, Mr. William Kirkby, who in his 84th year retains his full vigour of mind and body, and was able to step out with the youngest member of the party. They walked through Meanwood Woods and along the Leeds city side of the Meanwood Valley, whose stream is here the city boundary, as far as the Seven Arches, and thence home. Among the plants seen were *Milium effusum* (in the wood), *Senecio saracenicus* (near Smithy Mills), *Pedicularis sylvatica*, *Anagallis tenella* (Seven Arches), *Carex stellulata*, *C. paniculata*, *Scutellaria galericulata* (plentiful), *Helosciadium nodiflorum*, *Sparganium ramosum*, *Lysimachia nemorum*, *Carduus*

heterophyllus, and *Lycopus europæus*; and just outside Leeds, on Adel Moor near the Reformatory, *Chrysanthemum segetum*.

The conchological party was led by the Leeds Conchological Club, represented by Mr. W. Denison Roebuck, F.L.S., and its secretary, Mr. F. Booth, and investigated Bramley Fall Wood, the well-known habitat of *Hyalinia excavata*. The weather, so favourable for the garden party, was by reason of dryness inimical to conchological work, but nevertheless the shell was found, and a colony of fine examples of *Arion ater* var. *plumbea*, with one *A. subfuscus*.

The geological party started from Meanwood tram terminus, and was led by the Rev. W. Lower Carter, M.A., F.G.S. In Monkbridge Road was seen a curious section of Ganister beds, overlain by great numbers of blocks of Ganister, very angular and of various sizes, and laying in various directions. These may be due to glacial action, though they have only been broken off from the underlying beds. The sections exposed in Messrs. Rowley & Co.'s Ganister quarries were examined. Here numbers of erect tree trunks, often in very good condition, are found from time to time, a fine specimen having just been taken to the surface. Specimens of *Stigmaria* were very common. The chief interest of this section lies in the bed of clay, full of stones of local origin, overlying the Ganister beds. This clay is considered to be of glacial origin, but its real cause and significance have given rise to much discussion amongst local geologists. An eminent geologist present said that this section and the Balby boulder clay afforded the two great puzzles in the glacial geology of Yorkshire. The Ganister beds are traversed by a small thrust-fault, which was finely seen in parts of the quarry.

Cumberland Birds, 1707.—On 8th July, 1707, Bishop Nicolson was at Cardornock, near Bowness-on-Solway, and writes in his diary under that date:—‘Amongst the sea fowl the most remarkable were the *Larus maximus ex albo et nigro varius*; and the *Pica marina*, with a young one, which run (prodigiously fast) on the edge of the tide.’ The first bird is *Larus marinus* L. (the Great Black-backed Gull), and the second the Oyster-catcher (*Hæmatopus ostralegus* L.). Trans. Cumb. and Westm. Antiq. and Archæol. Soc., Vol. 4, N.S., 1904, p. 5. I have to thank Mr. T. H. Nelson, M.B.O.U., for kindly confirming the naming.—S. L. PETTY, Ulverston, 6th June 1904.



Ericerch Jones
John Hawell



In Memoriam.

REV. JOHN HAWELL, M.A., F.G.S.

THE news of the recent death of the Rev. John Hawell, at the comparatively early age of 49, will come as a sad surprise to naturalists throughout the country, so many of whom were his personal friends. Yorkshiremen will particularly mourn his loss, whilst his own parishioners of Ingleby Greenhow have lost a vicar to whom they looked for advice and help during the last 24 years.

To the Yorkshire Naturalists' Union Mr. Hawell was of great assistance, and his place will be exceedingly difficult to fill. He was President of the Geological Section, Divisional Secretary for North-east Yorkshire, and served on several committees. Whatever he undertook to do he did promptly and well. The excursions which he organised in his district were always most successful.

He was largely instrumental in bringing the Cleveland Naturalists' Field Club into its present flourishing condition. Of this society he was President in 1891, 1895-6, and 1903-4. Under his editorship the Cleveland Club has issued valuable annual Proceedings since 1895, which contain contributions to the natural history, etc., of the Cleveland area. In these Proceedings Mr. Hawell himself published papers dealing with the Mollusca, Geology, Physiography, etc., of North-east Yorkshire. The Yorkshire Geological Society is also indebted to him for papers on geology and palæontology. Under the latter head special mention might be made of his 'Description of Two New Species of Gasteropoda from the Upper Lias of Yorkshire' (1897).

To 'The Naturalist' Mr. Hawell was a frequent contributor, and so recently as August last a paper appeared from his pen dealing with the plant remains which he had found in the Oolitic beds of North Cleveland. In this paper he gave an account of the last piece of scientific work he was permitted to accomplish—his subsequent illness preventing him pursuing a work which to him was a pleasure and to science a profit.

In addition to the natural sciences Mr. Hawell was well acquainted with the antiquities, folk-lore, etc., of his neighbourhood.

He was buried at Greystoke, Cumberland, his native place, and leaves a widow.

NOTES ON YORKSHIRE BRYOPHYTES.

III. *REBOULIA HEMISPHERICA* (L.) RADDI.

F. CAVERS, D.Sc.(LOND.), F.L.S.,

Municipal Technical School, Plymouth.

(Continued from p. 214.)

Reboulia may be said as a general rule to prefer moist and shaded situations, though occasionally patches of this plant occur in somewhat dry and exposed places. The thallus is, in the latter case, capable of resisting a fairly long period of drought, during which the margins become rolled inwards, and growth may be resumed after the plant has been kept dry for several weeks.

Colonies of the blue-green alga *Nostoc* are frequently found between the ventral scales and the lower surface of the thallus, and occasionally also in the cells of the compact tissue of the midrib. *Nostoc* and other endophytic (perhaps symbiotic) algæ have long been known to inhabit specialised organs in certain liverworts (*Blasia*, *Anthoceros*), and the writer has observed the occurrence of the coiled chains of *Nostoc* in the tissues of *Fegatella*, *Preissia*, and *Targionia*, in addition to *Reboulia*.

The two kinds of sexual organs (antheridia and archegonia) are sometimes developed on the same plant, but more commonly on distinct plants. Both are formed in groups on specialised branches (receptacles), and both kinds of receptacle arise immediately behind the apex of a branch, on the upper surface of the thallus. In monœcious plants, one of the branches arising from a dichotomy gives rise to a male and the other to a female receptacle (Fig. 1, B.).

The MALE RECEPTACLE is sessile and forms a green cushion, oval, circular, or semilunar in outline (Fig. 1, A. B.). The receptacle is slightly raised above the general surface of the thallus, and is marked off by a deep groove, from which arise numerous narrow scales, usually reddish in colour. The upper surface of the receptacle is marked by blunt conical prominences, each showing a very small pore surrounded by numerous concentric rings of cells (Fig. 4, E.). Each pore leads into a canal which widens out below to a cavity containing a single antheridium (Fig. 4, A., B.). In the upper part of the receptacle the cells contain chloroplasts, and there are numerous

small air-chambers, some of which open on the surface by pores situated between the antheridial prominences. These air-pores, though small, frequently have the cells surrounding them arranged in two or three tiers, as in the more highly developed barrel-shaped pores of the female receptacle (Fig. 4, D.). The antheridia are developed in several longitudinal rows, the youngest being nearest the anterior margin. Leitgeb* states

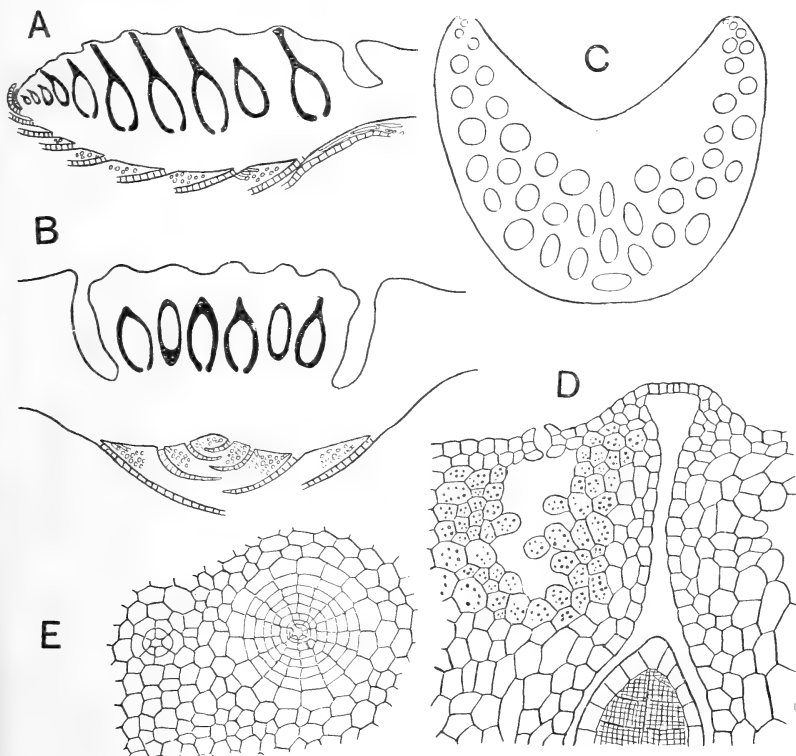


Fig. 4.—A.—Longitudinal section of male receptacle; the antheridial cavities are shaded, and the scales and rhizoids on the ventral surface are shown in part. $\times 20$. B.—Transverse section of male receptacle. $\times 20$. C.—Horizontal section of a receptacle with two growing-points, the latter showing the youngest antheridia, whilst the oldest occupy the posterior part of the receptacle. $\times 20$. D.—Part of A., $\times 150$, showing on the right the upper portion of an antheridium and its cavity; on the left an air-chamber opening by a small barrel-shaped pore; the cells around the air-chamber contain chloroplasts.

that the male receptacle of *Reboulia* is simply a dorsal out-growth of the thallus, and that the growing-point of the latter does not enter into the formation of the receptacle and can be recognised throughout, lying just below and in front of the

* Leitgeb, H., Untersuchungen über die Lebermoose, Heft VI., p. 83.

young receptacle. The writer's observations lead rather to the conclusion that the receptacle is derived directly from the growing point, and that the latter is used up in the process. In the crescent-shaped receptacles, the youngest antheridia are found at the ends of the two anterior horns, on either side of the sinus (Fig. 5, C.). This can hardly be interpreted otherwise than as the result of branching of the growing-point during the development of the receptacle. Moreover, in longitudinal sections through a very young receptacle, in which only a few young antheridia have been formed, there is no trace of the projection described by Leitgeb as invariably occupying the front of a receptacle and representing the growing-point of the shoot. At a later stage an outgrowth of this kind is present, and undoubtedly represents the beginning of an adventitious shoot, which remains dormant during the development of the receptacle but may afterwards grow out and give rise to an innovation-shoot. The male receptacle of *Reboulia* may therefore be regarded as representing a branch, having on its anterior margin a single growing-point, or, in many cases, two growing-points. Apart from the fact that the branching in the latter case takes place at a late stage, after several antheridia have been formed, and occurs once only, giving rise to a crescent-shaped receptacle, there is no essential difference between the receptacle of *Reboulia* and that of *Fegatella*, in which the branching takes place at an earlier stage and is repeated several times, giving rise to radiating rows of antheridia.

The ANTHERIDIUM is usually pear-shaped, tapering above to a pointed beak; the stalk is very short, and the wall consists of a single layer of large oblong cells. The compact tissue in the lower part of the receptacle, between the antheridia, consists of colourless cells. This tissue is highly mucilaginous and swells up on the addition of water. The cells forming the antheridium-wall and the antherozoid mother-cells are also mucilaginous, and the absorption of water by these tissues leads to considerable swelling and consequent pressure, resulting frequently in the forcible expulsion of the antherozoids from the pores on the surface of the receptacle. These explosive discharges are not so marked in *Reboulia* as in some other Marchantiaceæ in which they have been observed; the writer has, however, observed the jets of antherozoid-containing spray to rise to a height of about 5 cm. in *Reboulia*.

The FEMALE RECEPTACLE arises as a dorsal outgrowth immediately behind the apex of the branch (Fig. 1, B, C.). The

young receptacle is from the first hemispherical in form, and the archegonia are developed at an early stage. The first archegonium appears on the summit of the outgrowth, towards the posterior margin, then two others arise at each side, and finally two more at the front. The great majority of the receptacles examined showed six or seven archegonia, placed at about equal distances from each other. Sometimes only five were observed, and in rarer cases eight. Immediately outside of the archegonia, i.e., at the margin of the receptacle, there

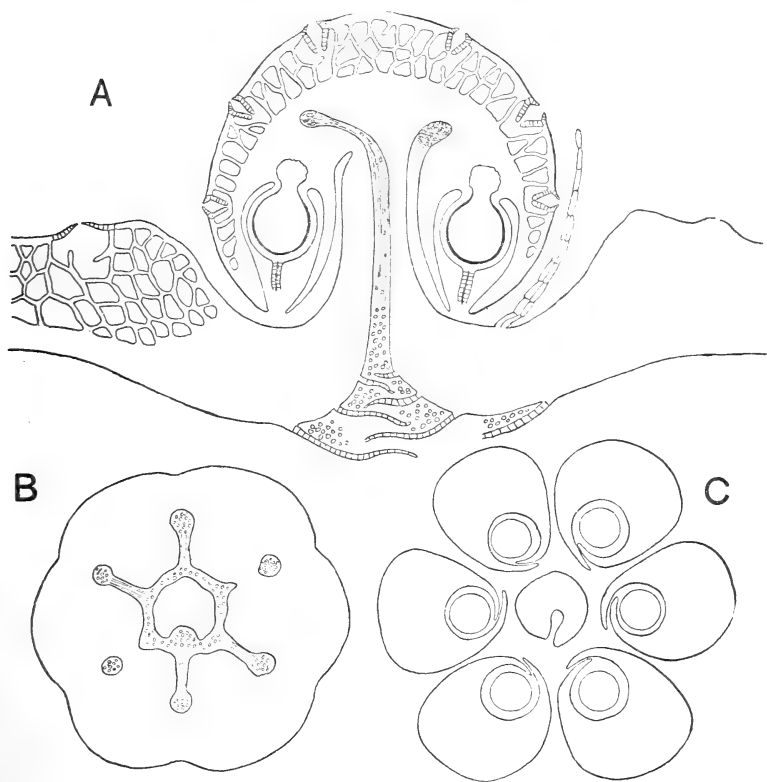


Fig. 5.—A.—Vertical transverse section of a female receptacle and the adjacent portions of the thallus. Two developing sporogonia are shown, each enclosed in its calyptra. The outer portion of the receptacle shows air-chambers with barrel-shaped pores, the inner portion consists of compact starch-bearing tissue, and the groove of the receptacle stalk shows in its upper portion numerous tuberculate rhizoids, in its lower portion a number of ventral scales. On the right, one of the band-like scales is shown arising from the tissue at the base of the stalk. $\times 20$. B. and C.—Two horizontal sections of a female receptacle. $\times 20$. B. is from the upper portion of the receptacle, and shows the six cavities from which spring tuberculate rhizoids, the latter passing into the groove on the ventral surface of the stalk. C. is taken at a lower level, and shows six sporogonia in outline, each in its involucre.

arise numerous long narrow scales, each ending in a club-shaped mucilage-hair. These scales are arranged in three or four concentric rows, and each appears to arise from a single superficial cell. The archegonia at first stand at the sides of the receptacle, but they soon become displaced owing to the active growth of the dorsal tissue, and are carried down to the lower surface. The growing-point is seen in the earlier stages occupying the front of the receptacle, but when the latter is fully formed the growing-point becomes used up in the formation of the stalk, which shows a single ventral furrow. During the development of the archegonia the tissue of the receptacle becomes differentiated into an inner region of compact colourless tissue and an outer region of green tissue with large air-chambers. The pores by which the latter communicate with the exterior are very conspicuous in the fully-developed receptacle, each pore being surrounded by eight or nine tiers of cells, the uppermost cells being very small and the lowest very large (Fig. 6, A.). The large cells of the lowest ring are capable of changing in form so as to partially close the pore. On treating fresh preparations with salt solution these cells become plasmolysed and the lower opening of the pore is greatly diminished in size. The cells of the epidermis have thick outer walls and contain little or no chlorophyll.

As the archegonia are carried on to the lower side of the receptacle, the surrounding tissue grows actively so as to form a sheath (involucre) around each of them. The margin of each sheath continues to grow downwards, becoming thinner and more membranous towards the margins. When the archegonium is ripe its neck projects beyond the opening of the involucre, curving upwards, and is surrounded by the numerous scale-like hairs, which serve to retain the moisture necessary to the opening of the archegonium neck.

The margin of the mature receptacle shows from five to eight (generally six) lobes, each lobe corresponding to an archegonium (Fig. 1, B., C.). Between the lobes there grow out, on the lower surface of the receptacle, bundles of tuberculate rhizoids, most of which pass into the furrow on the anterior (ventral) surface of the receptacle-stalk (Fig. 5; Fig. 6, A.). The lower surface of each lobe shows the two lateral valves of the involucre, which overlap each other, and beyond which the capsule ultimately protrudes.

Up to the time when the archegonia are ready for fertilisation the growing-point of the shoot is recognisable in front of the

receptacle, the stalk is extremely short, and no tuberculate rhizoids have been developed on the receptacle. Evidently, therefore, the apical growth of the branch remains in abeyance during the early development of the receptacle. If fertilisation occurs in one or more of the archegonia this growth is arrested, because then the growing-point is used up in the formation of the receptacle-stalk. The receptacle grows in size, numerous rhizoids are developed, and the compact tissue in the receptacle,

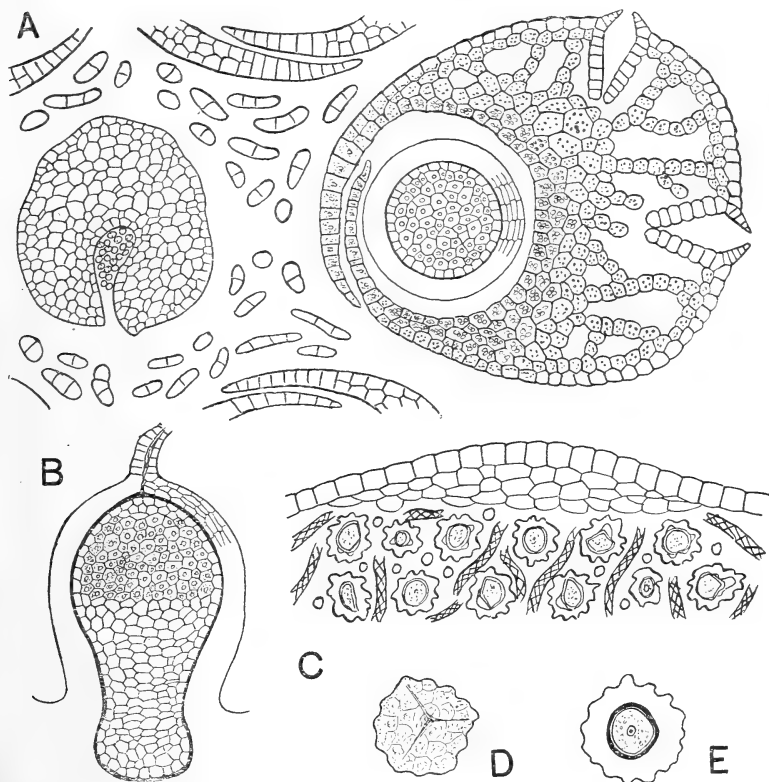


Fig. 6.—A.—Part of Fig. 5, C., $\times 90$, showing on the left the receptacle stalk with its ventral rhizoid bearing groove, on the right one of the lobes (involucre) with a sporogonium enclosed in the calyptra. The outer portion of the lobe shows air-chambers, opening by large barrel-shaped pores, the inner portion consists of compact starch-bearing tissue. Between the stalk and the involucre are shown the narrow scales in cross-section. B.—Longitudinal section of a young sporogonium, with its calyptra. In the upper portion (capsule) of the sporogonium the archesporial tissue is shaded. $\times 90$. C.—Upper portion of a nearly ripe capsule in longitudinal section, showing the lens-shaped apical cap and some of the spores and elaters. $\times 120$. D.—Spore in surface view, from the inner side, showing the three radiating ridges. The surface is covered with a network of smaller ridges. $\times 200$. E.—Spore in section, showing the thin endospore, the exospore (shaded), and the thick outer coat (episporium) with its ridges. $\times 200$.

above the insertion of the stalk, soon becomes filled with starch, to be used in the development of the sporogonia. Should none of the archegonia be fertilised, the apex of the branch resumes its growth, leaving behind the withered receptacle as a brownish prominence on the upper surface of the thallus. An abortive receptacle of this kind shows the characteristic barrel-shaped pores and the withered archegonia, but bears no rhizoids.

In a fertile receptacle the stalk grows actively for a time, the cells dividing repeatedly and showing a fairly regular arrangement in longitudinal rows. Some of the ribbon-like hairs are carried up at the top of the stalk, the rest remain at the base of the latter. The growth of the stalk then ceases for a time, whilst the development of the sporogonia proceeds actively. Fertilisation occurs in July and August, according to the writer's observations, and the ripe capsules open in many cases as early as March, though in plants growing in exposed and elevated situations this does not take place until as late as June. The dehiscence of the capsules is preceded by the elongation of the receptacle-stalk, which has hitherto remained very short. (Fig. 1, D.). This elongation, which takes place in a few days, is due simply to great increase in length of cells already formed. The cells of the stalk at first contain numerous small starch-grains, which are used up during this sudden growth in length. After the receptacle has thus been carried up to a height of from 2 to 5 cm., and the capsules have opened and shed the spores, the delicate receptacle-stalk soon droops and collapses, and with the receptacle itself becomes withered.

FERTILISATION.—The antherozoids set free from the ripe antheridia require water in which to travel towards the archegonia, and the latter also need water in order that their necks may open to allow the entrance of the antherozoids. As might be expected, therefore, fertilisation seldom occurs in plants which are not supplied with water.* Each male cell or antherozoid

*It is very probable that insects play a part in bringing about the fertilisation of both liverworts and mosses, by crawling over the plants and transferring water with antherozoids to the female plants, in the case of diöcious species. The explosive discharges of antherozoids, already mentioned, doubtless also serve to this end, the spray shot up in these discharges may be carried by air-currents to the neighbourhood of the archegonia. Discharges of this kind occur in several other thalloid liverworts, and they have been described by the writer in two recent papers ('Annals of Botany,' Vol. 18, 1904, pp. 87-120; 'Torreya,' Vol. 3, 1903, pp. 179-182) where the literature of the subject is given. But of course, in general, the required moisture will be furnished by rain or dew covering the plants, and the special means of effecting fertilisation just mentioned will only come into play during dry weather.

has a twisted body, showing usually two turns, and bearing at one end a couple of very fine threads or cilia, each about twice as long as the body itself. At the other end of the body there is usually attached a small vesicle, containing a few small starch-grains. This vesicle, which represents the residue of the mother-cell that produced the antherozoid, often becomes detached during the swimming movements of the male cell. The mature archegonium has the usual form of a flask with a slightly dilated lower part and a long neck. The neck contains a row of cells (canal-cells), and the dilated part (venter) contains the egg-cell. When water is absorbed by the archegonium, the neck-cells (which have become mucilaginous) are dissolved and a string of gummy liquid comes out at the end of the neck, which is now accessible to the swarming male cells. One of the latter eventually fuses with the egg-cell.

SPOROAGONIUM.—The fertilised egg-cell divides first by a transverse wall, and then vertical divisions occur, until the embryo consists of eight cells (octant stage). The four upper cells give rise to the capsule or spore-producing part of the sporogonium or fruit, the four lower cells grow and multiply and form a small spherical mass of cells, the foot. Between the large spherical capsule of the ripe sporogonium and the foot there is a very short neck or seta (Fig. 5, A.). The venter of the archegonium grows and keeps pace with the increase in size of the capsule, forming the calyptra, at the summit of which one sees the neck of the archegonium, now withered and tinged with red.

CAPSULE.—At a fairly early stage in the growth of the sporogonium the tissue of the capsule becomes differentiated into an outer layer of cells which will form the capsule-wall, and an inner mass of cells which will ultimately produce the spores and elaters. The capsule wall is a single cell in thickness, except at the summit of the capsule, where there is a lens-shaped cap of cells (Fig. 6, B., C.). This cap is 3 or 4 cells thick in the centre, thinning out to a single layer at the margin. In the lower part of the ripe capsule the cells forming the wall are entirely without ring-like or other localised thickenings of the cell-walls, but towards the apex of the capsule the cells have their radial walls thickened, especially at the angles between adjacent cells.

The ripe capsule eventually enlarges, breaking through the calyptra and emerging slightly from the lower surface of the receptacle (Fig. 1, E., F.). Then the apical portion of

the capsule-wall breaks up, not coming off as a coherent lid, as it does in foreign liverworts allied to *Reboulia*. Sometimes nearly half of the capsule-wall becomes detached in this manner, leaving the lower portion behind as a hemispherical cup containing the spores and elaters. Then the elaters, as they become dry, twist about and thus help to loosen the mass of spores, which fall out and may be carried away by air-currents, or may reach the ground and be washed away by rain.

The SPORE is usually nearly spherical, but shows three ridges meeting in a point on one side, whilst the opposite side is more rounded. The average diameter is about 60μ , but this varies considerably, owing chiefly to the varying thickness of the epispore, which is thrown into irregular folds and has the outer surface usually covered with a fine network of granules (Fig. 6, D., E.).

The ELATERS vary in length from 200μ to 350μ , and are occasionally branched; each contains 2 spiral fibres, or sometimes 3.

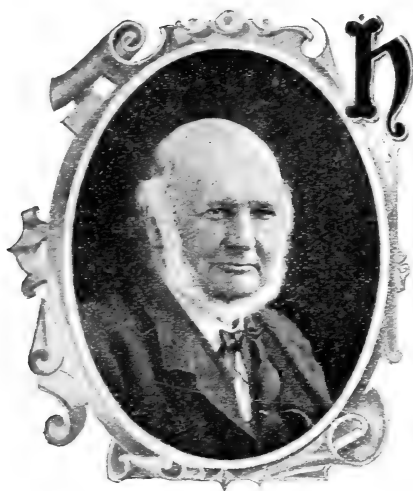
The spores germinate readily on damp soil. The coat breaks open and two tube-like processes grow out; one is colourless, growing down into the soil (root-hair), the other is green, and grows towards the light, either taking the vertical direction or growing along the surface of the soil (germ-tube). Very soon the germ-tube shows a large terminal cell, cut off by a cross-wall, and this cell then becomes divided up to form a small cell-mass, from which arises the growing-point of the thallus. The germ-tube and its terminal swelling ('germ-disc') may be regarded as representing the 'protonema' of a moss, but here, as in liverworts generally, the protonema is much reduced.

The writer has been materially assisted in research on the Hepaticæ by a Government grant allotted to him by the Royal Society.

NEUROPTERA.

Cordulia ænea, etc., at Ambleside.—A batch of water-born flies, taken in Rydal from the neighbourhood of the river and mere, during early June, have been kindly identified for me by Mr. G. T. Porritt. Amongst these were the Dragon-fly (*Cordulia ænea*), and he suggests that a note of this might be interesting to readers of 'The Naturalist,' as it seems not to have been recorded hitherto for the north of England. *Dictyopteryie microcephala* was also among those named.—MARY L. ARMIST, Rydal, Westmorland.

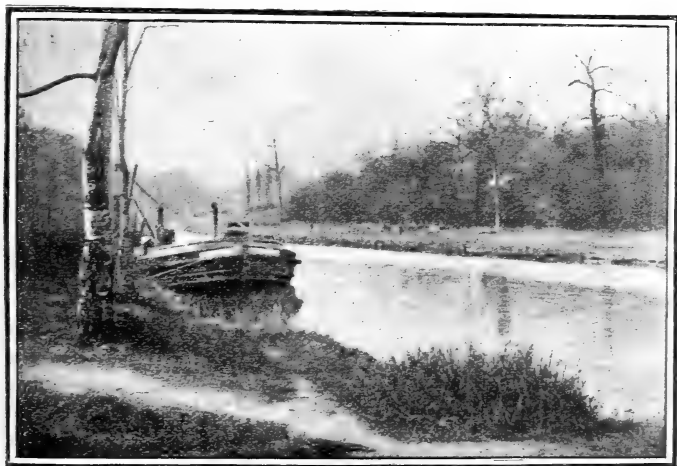
REVIEWS AND BOOK NOTICES.



HISTORY, Reproduction and Development, Food and Habits, Fossil, Variation, and Geographical Distribution, are the headings under which *Agriolimax agrestis*, *A. lævis*, *Milax gagates* and *M. soverbii* are dealt with in Part X. of Taylor's 'Monograph of the Land and Freshwater Mollusca of the British Isles.' On general lines the present instalment is on the same plan as the

R. D. Darbishire

previous part, noticed in these pages last November (pp. 445-446). At the head of *Milax gagates* is a portrait of Mr. R. D. Darbishire, well known to our readers, who first discovered the



Banks of Leeds and Liverpool Canal, near Kirkstall.

species in England, and under *Agriolimax laevis* is a photograph of a favourite locality for the species, which we are able to reproduce. Other illustrations are given, including several anatomical drawings. There are also maps showing the distribution of the different species, and a beautiful coloured plate, illustrating the varieties of *Limax cinereo-niger*, a species dealt with in the previous instalment of this work. It is now over three years since the first volume was finished, and since that time only three parts, containing about 150 pages in all, have been published. We should like to see a little more progress made, though it must be admitted each part represents an enormous amount of labour.

The fifteenth report of the Missouri Botanical Garden, 1904, contains a well-illustrated paper on 'An Ecological Comparison of some Typical Swamp Areas,' by S. M. Coulter.

'A Descriptive Handbook to the Bed of Economic Plants in Lister Park, Bradford,' compiled by the Advisory Committee, has been issued. About seventy plants are described in detail, the particulars being of a useful character and likely to be of service to the interested visitor. 'The plants are grown, not because they possess special beauty, but that visitors to the Garden may have the opportunity of studying in their living state, plants with the names and products of which they are familiar, from their use in medicine, food, or commerce.'

Messrs. Cassell & Co. have issued a 'Popular Edition' of 'The Field Naturalist's Handbook,' by the late Rev. J. G. Wood and Rev. T. Wood, at the low price of one shilling. This is arranged according to months, and contains particulars of the dates of appearance of butterflies, moths, and wild plants, with a few notes on birds' eggs. The 'Insects' and 'Plants' are arranged in order, with 'Popular names,' 'scientific names,' 'localities,' etc. The nomenclature is not always of the most recent, suggesting as one writer has already done, that 'A scientific name' should be the heading of one column. 'The Field Naturalist's Handbook' contains over 160 pages, and is a wonderful shilling's worth. It will be very useful to teachers interested in Nature Study.

'Sir William Henry Flower, K.C.B., etc., a Personal Memoir,' by C. J. Cornish, has just been published by Messrs. Macmillan & Co. In this well-written and interesting book much is said of the personal side of the life of the late Sir W. H. Flower—his early education, his military career, his social life. Whilst this is not without value, the average reader will look to the Memoir for some account of Flower—as museum director, naturalist, and author. In this he will not be altogether disappointed, though this side of Flower's life appears to take a secondary place in the volume. Flower's youngest son, Mr. V. A. Flower, has written the first two chapters to the work, and Lady Flower contributes the concluding chapter, 'His Last Years,' which is beautifully written. There are three appendices, that consisting of a 'List of Published Writings' being of especial value, and constitutes a better record of Flower's contribution to science than does the Memoir. There is an index which consists principally of personal names.

Naturalist,

Messrs. Wiggan & Lake, publishers, Louth, have issued a 'Popular Guide' to the Louth District, at the low price of one penny, which will doubtless do much to further the interests of natural science in that interesting locality. To this Mr. C. S. Carter contributes natural history notes on various subjects. Valuable lists of mammals, birds, insects, etc., are given. Under the heading 'Bugs' we find, 'Bugs! Yes, bugs; don't



Hubbard's Valley, Louth.

be alarmed, *air* bugs, *not* bed bugs, of which, fortunately, I have no records for Mablethorpe, but of 'air bugs' a specimen was captured in 1901 by a visitor, and identified as *Verlusia rhombea* L. All the localities previously given for this insect were south of London.' The 'Guide' is illustrated by various process blocks, one of which, representing a Lincolnshire 'beauty spot,' we are permitted to reproduce.

Mr. C. Crossland has issued amongst his mycological friends a limited number of copies of 'The Fungus Flora of Halifax,' reprinted from the recently published 'Flora of Halifax.' The reprints have an addition of two coloured plates and a preface. The plates contain 49 figures of important local fungi, and amongst them three are figured for the first time, viz., *Pocillum Needhami*, *Calonectria vermispora*, and *Dilophospora albida*. A copy has been placed in the Halifax Public Library, where it can be referred to.

The thirty-third annual report of the Chester Society of Natural Science, etc., for 1903-4, has just been issued. There is a net increase of 40 members during the year, bringing the present membership to 1,011. The report includes brief notes on 'An Unrecorded Cheshire Sandgrouse' and 'Red Necked Grebe in Cheshire,' by C. Oldham, and 'Notes on some white eggs of the Waterhen,' by R. Newstead. There is also a report on the Meteorology of Cheshire for 1903, by the Rev. J. C. Mitchell.

FIELD NOTES.

MOLLUSCS.

Molluscs at Tetney.—The Leeds Conchological Club made an excursion to Tetney Lock, Lincolnshire, on Easter Tuesday, 5th April, with the object of observing *Amphipeplea glutinosa*. The services of Mr. C. S. Carter, of Louth, were enlisted as guide. Mr. Carter led the party to places which yielded the following species:—*Limnæa peregra*, *L. stagnalis*, *Planorbis contortus*, *P. vortex*, *P. umbilicatus*, *P. spirorbis*, *P. corneus*, *Paludestrina jenkinsi*, *P. ulvæ*, *Sphærium corneum*, *S. lacustris*, *Physa fontinalis*, *Bythinia tentaculata*, *Valvata piscinalis* (a few dead shells), *Anodonta cygnea*, *Helix nemoralis*, *H. arbustorum* (dead shells), *H. caperata*, *H. rufescens*, *Pupa muscorum*, *Alexia myosotis*, *Macra stultorum*, *M. solida*, *Solen ensis*, *Tellina balthica*, *Cardium edule*, *Littorina littorea*, and *Amphipeplea glutinosa*. Unfortunately, the dyke yielding *A. glutinosa* had been recently cleaned out, though evidence of the abundance of freshwater mollusca was seen in the dead shells in the mud thrown up on the banks, and we were fortunate to obtain a few each which had escaped the hands of the dredgers.—THOMAS CASTLE.

Molluscs at Hebden Bridge.—Hebden Bridge is not a favourable district for molluscan life, and at the Yorkshire Naturalists' Union excursion there on 11th June conchologists did not expect great things. Arriving early, the writer with others first tried the canal near the station, but the result was nil. Following the course of the river Hebden, in Foster's Mill Dam *Pisidium fontinale* was found in great profusion with *P. pusillum* less common; on the wall in a narrow part of the same dam *Limnæa peregra* was secured in fair numbers, and *Arion circumscriptus* was found in Lee Wood. In Pecket Wood Mr. T. Crowther (Elland) found *Vitrina pellucida* (dead shells), *Agriolimax agrestis*, *Hyalinia crystallina*, *H. nitidula*, *Helix hortensis* (young), *H. rotundata*, and *Cochlicopa lubrica*. Mr. W. Denison Roebuck (Leeds) joined the party at the Lodge, and between there and the refreshment room, along the sides of the stream, we found *Arion minimus* (which had not before been recorded for the parish of Halifax), *A. subfuscus*, *A. ater*, *Hyalinia alliaria*, *H. pura*, *H. crystallina*, and *H. fulva*. On the return journey, near Pecket Wood, *Agriolimax agrestis* was found in great numbers and variety along with *Limax maximus* and *Arion hortensis*; and in the wood *Hyalinia excavata* and

H. fulva were found. Mr. T. Castle (Heckmondwike) found *Limnæa truncatula* and *Pisidium pusillum* near the head of Crimsworth Dean. In all 21 species were noted, 11 of which had not been previously recorded from the district. The following is a complete list :—

Limax maximus.
Agriolimax agrestis.
Arion ater.
Arion subfuscus.
Arion hortensis.
Arion circumscriptus.
Arion minimus.
Vitrina pellucida.
Hyalinia alliaria.
Hyalinia nitidula.
Hyalinia pura.

Hyalinia crystallina.
Hyalinia fulva.
Hyalinia excavata.
Helix rotundata.
Helix nemoralis.
Cochlicopa lubrica.
Limnæa peregra.
Limnæa truncatula.
Pisidium fontinale.
Pisidium pusillum.

—J. E. CROWTHER, Elland.

***Paludestrina jenkinsi* in Spen Valley.**—I found this mollusc on 12th June in the Hunsworth Wood district of Spen Valley in the upper part of the river Spen, where it occurs in profusion on *Potamogeton crispus* and also in the sunken grass roots at the edges of the stream, which is here about two yards wide and two feet deep. The nearest localities are Dukinfield (Cheshire) and Droylsden (Lancashire), where it is found in the canals. The Spen enters the Calder some $3\frac{1}{2}$ miles from Hunsworth Woods, and several weirs intervene between that place and the confluence; the nearest canal is at Brighouse, some four miles away on the other side of the ridge, and this joins the Calder three miles higher than the Spen. (The Calder is connected with the Dukinfield district by canal viâ the Stanedge tunnel.—ED.) I have visited the place three or four times a year for the last four years, but had not seen any trace of them until this, my first visit this year. Only about one per cent. are carinated, and these not very decidedly on all the whorls; a good proportion are of large size compared with specimens from Grimsby. Several mills higher up the valley turn their waste water into the stream and thus it is not a clear one, though occasionally on Sundays the bottom may be seen.—THOS. CASTLE, Heckmondwike, 24th June 1904.

NORTHERN NEWS.

Mr. L. B. Prout gives notes on 'Some Recurrent Phases of Variation in the *Larentiidae*' in the June 'Entomologist,' in which he cites as 'a perfect example' of one form of variation 'the exquisite *Cidaria suffumata* ab. *Porrittii*, of the Huddersfield and Dover districts.'

Mr. W. G. Fearnside, M.A., F.G.S., has been elected to a Fellowship at Sydney Sussex College, Cambridge.

A Partridge nest with fifteen eggs has been found on the top of a hay stack, fifteen feet from the ground, at Burn, near Selby.

In the January 'Popular Science Monthly,' Dr. F. A. Bather gives a useful re-survey of his favourite topic—'The Functions of Museums.'

The death is announced of Mr. Frank Rutley, formerly of the Geological Survey. He was the author of the first English text book on Petrology.

In the 'New Phytologist' (April) Mr. F. W. Oliver has some 'Notes on *Trigonocarpus* Brongn. and *Polylophosphermum* Brongn., two genera of Palæozoic seeds.'

Mr. R. Standon contributes some notes on the Zebra-Mussel (*Dreissensia polymorpha*), and refers to its distribution in Lancashire and Cheshire, in the 'Journal of Conchology' for July.

We regret to record the death of Mr. Robert McLachlan, F.R.S., at the age of 67, editor of the 'Entomologists' Monthly Magazine' since 1864, and author of various works on entomology.

At a meeting of the Leeds Conchological Club held at Cawthorne, Messrs. J. E. Crowther and F. Booth were elected Hon. Secs. in place of Messrs. J. W. Taylor and W. Denison Roebuck resigned.

In the Transactions of the British Association of Waterworks Engineers for 1903, recently issued, Mr. H. Preston has a valuable paper on 'The Geology and Underground Water Supply of South Lincolnshire.'

Mrs. Percy Sladen, widow of the late Walter Percy Sladen, formerly of Halifax, in the desire to perpetuate the memory of her late husband, has undertaken to devote the sum of £20,000 to the promotion of scientific research.

The recently-issued 'Journal of the Manchester Geographical Society' contains an address by Prof. W. Boyd Dawkins on 'The opportunity of Manchester,' in which he advocates the utilisation of the Infirmary site for a Free Library, Art Galleries, and a Commercial Museum.

In the 'Hull and East Riding Teacher' for March-April, Mr. J. F. Robinson contributes 'The East Riding—an appreciation,' in which he proves to be rebellious the stereotyped description of this area as 'low-lying, flat, damp and depressing, and generally tame and uninteresting.'

The 'Cumberland Nature Club' has been formed for the promotion and fostering by mutual assistance a knowledge and love of Nature. The subscription is 2s. 6d. per annum. Canon Rawnsley is the president, Mr. T. Postgate, director; and Mr. Oglethorpe, Lorton, Cockermouth, secretary and treasurer.

Several nesting 'curiosities' are recorded in the local press. At Hotham (East Yorks.) a Blackbird's nest, with eggs, was found directly on the top of a Wren's nest, with young, the Wren effecting an entrance to her abode through a hole in the side. In the same division of the county a Robin's nest was found in the skull of an Ox, under a hedge.

Mr. W. H. Thompson (Hull) contributes 'John Phillips, the Geologist,' to the June 'Gentlemen's Magazine.' It is strange that no previous biography of Phillips should have been written. Mr. Thompson states 'The fact that he was a bachelor, and had thus no living son or daughter to keep his memory green, may partly account for the omission.'

Mr. G. C. Crick, F.G.S., has recently figured and described a new Nautiloid (*Pleuromautis pulcher*) from the Carboniferous Rocks (Proc. Malacological Society, March 1904). The type specimen, now in the British Museum, was obtained by the late J. W. Davis, probably from the Pendleside series of Hebden Bridge. Other examples, undoubtedly from that locality, are in existence.

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PUBLICATIONS RECEIVED.

How to make Notes for a Rock-soil Flora, E. A. Woodruffe-Peacock; Nature Study, July; Zoologist, Nautilus, and Field Naturalists' Quarterly for June; New Mexico College of Agriculture, Bulletin No. 50, and Fourteenth Annual Report; Tufts College Studies, No. 8; Second Annual Report, Horniman Museum; Anales del Museo Nacional de Montevideo, Serie II., Entrega I., 1904; Journ. Manch. Geog. Soc., April-June, 1904; Trans. Entom. Soc., Part 2, 1904; La Nuova Notarisia, Luglio, 1904; Proc. Academy of Nat. Sci. Philadelphia, Vol. 56, Part 1, 1904.

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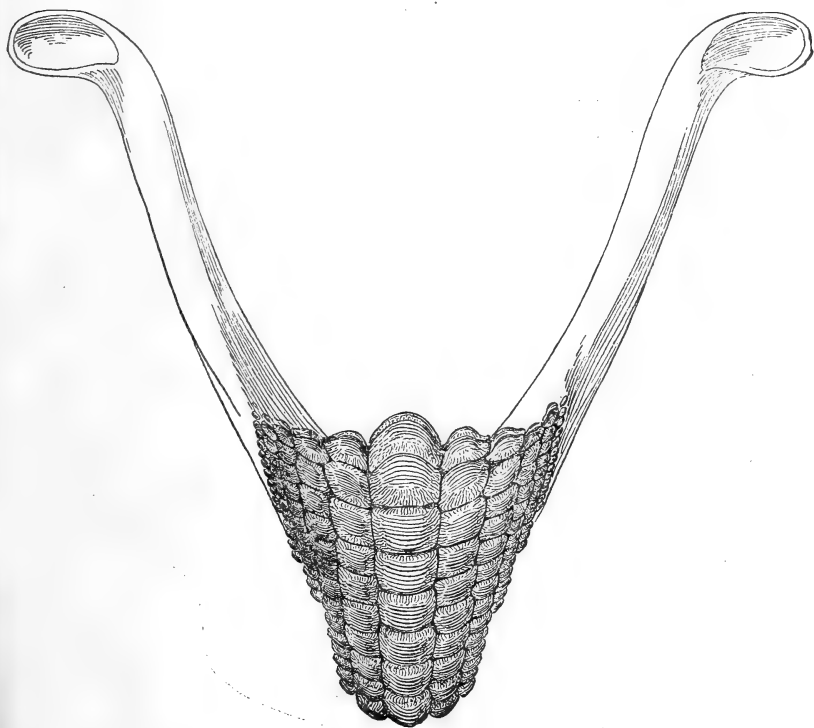
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NOTES AND COMMENTS.

PTYCHODUS TEETH IN CHALK.

The 'Sharks' palate teeth,' with their hard-ribbed, enamelled surfaces, have long been known to collectors of chalk fossils in Yorkshire and Lincolnshire. Few of these, however, are aware of the probable arrangement of the teeth in the mouth of the fish. Until recently no traces of the cartilaginous jaws have



Restoration of Mandible of *Ptychodus decurrens* (Woodward).

been found in association with the dentition, but by the researches of Mr. H. Willett specimens have been discovered which throw new light on the subject. These are from the Lower Chalk (*Holaster subglobosus* zone) at Glynde, Sussex, and are described and figured by Dr. A. Smith Woodward in the May 'Quarterly Journal of the Geological Society.' By the permission of the council of the society we are able to reproduce

a life-size restoration of a jaw of *Ptychodus decurrens*, based on the Glynde specimens, which clearly indicates the relative positions of teeth and jaw. As to the precise zoological position occupied by *Ptychodus*, as indicated by the recent discovery, reference should be made to Dr. Woodward's paper.

PRE-HISTORIC POTTERY.

We recently figured in these columns a British hand-made vase, with a handle, found near Grantham. Through the courtesy of Messrs. A. Brown & Sons we are now able to illustrate a Yorkshire example of a somewhat similar type, which was taken from a Bronze-Age barrow on the wolds near Aldro in 1868 by Mr. J. R. Mortimer, who now has it in his



museum at Driffield. The vessel, which is represented half-size in the illustration, was found with the skeleton of a youth. At the top and bottom are rows of small circles, a type of ornamentation rarely met with on pottery of this period. The bottom of the vessel is ornamented by an incised cross. Further details of this discovery will appear in Mr. Mortimer's forthcoming work.

ENGLISH HEDGEROWS.

A. H. PAWSON, J.P., F.L.S., F.G.S.,

President Yorkshire Naturalists' Union.

I WISH to sing the praises of the English hedgerows. We islanders are rather apt (whether rightly or not let others judge) to speak of our own ways and institutions and belongings (and this not boastfully but as a matter of common knowledge) as of something superior and apart, hardly to be attained by the other nations, and then only by way of imitation. I have heard it maintained, for instance, that we are the only people that have homes and family life: the sea of course we hold in fee simple, and the oak is not willingly allowed to be native in other lands. In order not to come short of others in this praiseworthy patriotism I will now chaunt the eulogy of the hedges which enclose our green fields and our pasturing cattle, and I can do it honestly and truthfully, for, as far as my own observation extends, they form a landscape which is peculiar to our island.

England is naturally pastoral, and it is becoming more so. Its verdure is the quality of it which most attracts a foreigner. The land is fitted for flocks and herds: it is the paradise of ruminating animals and will grow profitably all grasses except bamboos and the cereals—a country in short of beef and not of bread. Thus the modesty rather than the veracity of those people is to be impugned who bring forward the roast beef of Old England in proof of the supremacy of our country to the humiliation of the foreigner.

The real corn countries, as the uplands of Sicily and Spain (I speak only of what I have seen), present a pitiable appearance when the crop is off the ground—and it is reaped in July. Then, a tawny wilderness lies about you which produces no herbs that will fatten a sheep or pasture a milking-cow. Only goats can pick a meagre livelihood out of the grey-green shrubs and make-believe grasses. There you drink your coffee black. Olive oil takes the place of butter, or, if you must needs be superfine, you may have it in air-tight tins all the way from Denmark. Such a land has no need of fences; there are no grazing animals to enclose, for you may as easily fence in a squirrel as a goat.

The primary use of hedges, for shelter and as fences against cattle, is obvious, but I am disposed to maintain that our hedge-

rows are of the race and of the soil, and that the universal planting of them has a deeper significance than appears at first sight. The old saying, that 'an Englishman's house is his castle,' might very well have been extended to his field, which he prefers to regard as his principality. Hence he fortifies his boundary with a strong hedge and admits no man within forty inches of its stake-root. He dislikes to be overlooked also. A Frenchman is content with a line of boundary stones, which shows his marches and yet allows him to plant every foot of his ground, but an Englishman does not hesitate to throw away two or three yards of width on every side of his field for the sake of his privacy.

The delightful appearance also of a green hedge is a great attraction to our countrymen. This is with us not a matter of pure utility and convenience, but one of fitness and of beauty. As a race we are fond of the country and of an outdoor life. No people so willingly gives up so large a portion of its garden to flowers and shrubs as the English, whether you take a cottage plot of a few square yards, or the grounds of several acres which may surround a mansion. A German or a Swiss peasant will usually grow only fruits and vegetables, and the vineyards commonly come close under the windows of a French château. 'English garden' is the name which is given generally on the Continent to any part of the public parks which is laid out in lawns and shrubberies and flower-beds. In spite of the reproaches which have been so long heaped upon us, that we are a nation of shopkeepers and money-grubbers, with no politics but those of the Manchester school, I have always been of the opinion that we are all really country gentlemen at heart, and that we are only masquerading in the guise of merchant manufacturers and the like. And what could appeal more strongly to the lover of our island-country than its incomparable hedgerows, white with May-blossom, sweet with honeysuckle or eglantine, or jewelled with the bright fruits of autumn?

For my own part I can hardly regard a hedgerow as artificial; it seems to me as much a part of Nature as a wood or a heath; and it has this in common with all things natural, that, while they are perfectly adapted to the useful purpose for which they were designed, they are also exquisitely and superlatively beautiful. For, if one had to plan and contrive some way of growing and displaying our native vegetation to the best advantage and at the same time of fostering and encouraging all manner of animal life, birds, mammals, reptiles, bees, butterflies,

and all insects, I truly think that by no fertility of imagination or ingenuity of design and by no happy inspiration could anything have been discovered to equal the hedges with which our land is covered as with the finest network.

Think of the artless ingenuity of it all! You needed only to fence in your cattle or to shelter your crop from the wind, but you have planted four hedges, each facing to some different point of the compass and its reverse, north, south, east, west, or to anything between these cardinals: so that within a square mile, so many are the rows, you shall not find a single exposure in the whole area which is unrepresented. These hedges too are placed on mounds which favour dryness, yet on one side is a ditch, and in a short space you find every degree of moisture from cool dampness to running water. Thus you have every possible exposure and every conceivable condition of soil. No wonder that those children of the hedges, the roses and the brambles, are so fickle and uncertain and changing in their moods when they have so much choice of habitat. They find so many pleasant ways of growing that they cannot make up their minds which they like best. Long may they flourish to deck the maiden's hair and to stain the children's lips, and to pain and delight the laborious botanist!

All the natural flora of the country driven by agriculture from the fields has taken refuge in their hedgerows. There is hardly a plant native to the level which you will not find on some of the banks or in some of the ditches, and the foster-nurse of them all is the hawthorn. 'The hawthorn,' says Jefferies, 'is a part of English life—country life. It stands side-by-side with the Englishman as the palm tree is pictured side-by-side with the Arab. You cannot pick up an old play or book when English life was in the prime without finding some reference to the hawthorn'; and again 'Nightingales love hawthorn and so does every bird. Plant hawthorn and every bird will come to it from the wood-pigeon to the wren.' Let it suffice for its praise that the common name of the hawthorn-bloom is May. It is called after the month which is the prime and pride of the year—from mid-May to mid-June as we now reckon it—the old English May of the poets, the month which in Catholic countries was sacred to the Blessed Virgin.

Alongside the hawthorn whatever is choicest among our native shrubs is most at home in a sunny hedgerow. Where else do the wild roses grow, or the honeysuckle or the crab-apple? How otherwise should we have nuts and blackberries?

How could the bryonys climb, and where could they hang their votive chaplets? Where would the clematis find a spot on which to spread out its fleece of silver? Many of these plants are climbers: they need some nursing-shrub on which they may lean or to which they may attach themselves by tendril or twining stem, or by hooks and prickles, so that they may grow aloft and reach the open air and the full sunshine; and to help them upwards is the office of the kindly hawthorn.

The summer glory of the hedges gives place in autumn to utility. Then they become wild orchards, teeming with all manner of fruits for bird and beast, a rich harvest of haws and rose-hips, of nuts and brambles, elderberries, sloes, and acorns. They are veritable fruit-walls, these hedgerows, and often remind one of the mulberries and poplars which serve in South Europe as the nurse-trees of the vine.

Except, perhaps, in the grounds and parks of great houses, which are not for everyone, it is only as they stand singly along the hedges that we see the full beauty of our native trees, the strength of the oak, the grace of the ash, the loftiness of the elm. In a wood there is too great a crowd: you cannot see a tree for the trees, but here you can walk round each one of them; and so can the sun, and every part of them is lighted and ripened by his rays. How fine is their foliage, how free their growth, how abundant their fruit! They have in every way a better time than their brothers of the woods.

The hedges cherish England's fauna not less than her flora, for they are the greatest cause of our abounding birds (and here again I justly swell with patriotism, for have we not as many singing birds in many an English parish as you will find in a Continental province?). Birds love shelter but not deep shade: indeed, gloom is not favourable to life of any kind, and we are told that the dense forests of the tropics are as lonely and silent as our own pine woods. A thick branching hedge, with herbage and tangle at its foot, and a tall tree springing from it here and there, with mossy stumps and pollard ashes grown over with ferns and ivy, is just what a bird desires when he is looking for a home. Here is shelter and yet sunshine, shade without sadness: in fact, in whatever way he likes to build his nest, in such a hedge he can find a proper place. In a word, *he is suited*: so down drop the migrants in myriads on our land to cheer us all the summer through by the dainty sight of them and by their sweet songs.

The hedges are the highways and footpaths of all the animals. The life of the country courses along them as the blood through our veins and arteries, and through their endless ramifications, like minutest capillaries, it vivifies the whole land. The birds follow the friendly screen of the boughs, and the little beasts move safely along the banks and through the ditches and pass out of sight from field to field; so that probably many a hedgehog, though about every night in the summer—a *sizeable* beast, too, and one neither able nor very anxious to evade an approaching footstep—lives a long life and dies of old age unseen by human eye.

When from some vantage-point we look down upon a wide stretch of our fair English land, as from the Hambledon Hills on the Vale of York, or from the North Downs on the Weald of Sussex, or from Malvern on the Severn Plain, the view is like that of an open wood, so countless are the hedges, so numerous the forest trees sprinkled along them. Not a road, hardly a footpath, but is bordered by them. The land owes half its beauty to them. The whole 'pageant of summer' is enacted under their branches, from the first violets and primroses to the latest berries of autumn: here the birds love and sing and all the wild animals hold their revels. We look upon these hedge-rows and (like the Ancient Mariner) we 'bless them in our heart,' for without them our country would no longer be the Merrie England that we love.

FLOWERING PLANTS.

***Mertensia maritima* in Walney Island.**—In Mr. J. Cosmo Melvill's article on botany in the 'Court Guide and County Blue Book of Lancashire' he states that this plant is 'probably nearly or quite extinct on Walney.' I am glad to record that during a visit to the Island on 11th June I counted about a score of plants in one locality.—HARPER GAYTHORPE, Barrow-in-Furness, 13th June 1904.

Abnormal Willow-herb in Spen Valley.—While looking for a recurrence of the abnormal Figwort recorded in 'The Naturalist,' 1903, page 383, although unable to find another specimen, curiously enough I saw within two yards of the spot where it grew a similar abnormality in the Willow-herb (*Epilobium montanum*). One shoot of this specimen had three leaves at each node instead of the normal two. The arrangement of the flowers was normal.—T. CASTLE, Heckmondwike, 7th June 1904.

CHANGES IN SPURN POINT AND THEIR BEARING ON THE SITE OF RAVENSER.*

THOS. BLASHILL, F.R.I.B.A.

IN 1869, when I first observed the action of the sea in transporting long banks of shingle across the mouths of the small rivers on the coast of Sussex, I was struck by their resemblance to the formation of Spurn Point. The tidal inlet called Pagham Harbour, on the east of Selsey Bill, then presented a good example of these 'travelling beaches,' the gravel having extended quite across the mouth of the inlet so that the tidal waters were rapidly eating into the further shore. At the same time the waves were destroying the bank at the point where it had jutted out, so that the formation of a new entrance to the harbour at that spot seemed probable. But soon afterwards the harbour was reclaimed and this interesting process was stopped. I found that there were many cases where such a result had actually happened, and one in particular on the south-east coast of Ireland, where a sandbank travels across the mouth of an inlet and is destroyed and renewed at the point from which it starts at intervals of about twenty years. Mr. R. G. Allanson-Winn, whom I have asked, kindly suggests that this is Tacumshin Lake on the coast of Wexford. Except that the process is shorter and more regular it closely corresponds with the formation of Spurn.

When I undertook this paper I had not seen the report of Mr. Clement Reid in the 'Geology of Holderness' (Geological Survey Memoir), where he shows by good evidence that such a process is going on intermittently at Spurn, but though this idea is not now new, it seems that little has been done to make the behaviour of this travelling beach and the historical records of Ravenser explain each other. I need hardly point out that the records to which I shall have to refer have been brought together by Mr. J. R. Boyle, F.S.A., in his 'Lost Towns of the Humber,' published in 1889.

In 1066, when the army of Northmen, defeated by Harold, departed from Ravenser, that name was applied only to the original haven in the parish of Kilnsea, then protected from the sea by a spit of shingle that had probably not progressed very

*Read at the Spurn meeting of the Yorkshire Naturalists' Union, 2nd July.

far from the mainland. As this travelling beach lengthened the deep water channel formed by the back current would move along with it, so that the men of Ravenser would have farther to go to reach the ships. And before 1235, when the mass of shingle at the extremity had grown large enough, they transferred themselves with all that appertained to them to that site. To this day a solitary farm house in Holderness is called an 'odd' house to distinguish it from the ancient farms always built in the villages. No doubt this was the idea that gave rise to the name of Ravenser Odd. It would be a town of low timber buildings, some of them partly constructed of cobbles from the beach. It was founded upon the area of clean gravel through which the sea water flowed freely, rising to the height of every tide. If I am right as to the nature of its commerce there would be little wheel traffic or none. It might be important in relation to other seaport towns of that day, but all were small. The town of Kingston-upon-Hull was not incorporated nor even founded when Ravenser Odd was of sufficient importance to contend with Grimsby for the commerce at Humber mouth. The details of that contention help us to understand what that commerce was.

There was never in the neighbourhood of Ravenser, or of Grimsby, any demand for the wines or merchandise coming to those ports. There would be a great demand in all the towns on the rivers that were accessible from the estuary and, in the state of the roads, water carriage was essential. Of this Grimsby had had the monopoly, but when the new port was established on the Point of Spurn, Grimsby had to contend with Ravenser Odd for the same traffic. Owing to the intricate navigation the larger sea-going vessels would have to discharge their cargoes wherever they found the best market. The merchants of both ports lived by purchasing these cargoes, which they met at the mouth of the Humber, and sending the merchandise in small vessels up the rivers. For this traffic Ravenser Odd, which jutted out into the sea by which the laden vessels were expected, had the advantage. Hence the accusations of 'forestalling' and the deceits to which merchants and bargainers are liable, and for which they must answer as well as they can.

We need not be at the pains to disentangle the records of Old Ravenser and Ravenser Odd. Except for the manor house the old town had disappeared, and the port and the commerce, with all rights and responsibilities, belonged only to the new

town, which was often called Ravenser simply. Before the year 1350 the sea was threatening its existence. The narrow connecting beach disappeared first, so as to leave the town on an island. This would cut off the supply of shingle needed to maintain the waste of the shore of the island. The inhabitants would know nothing of groynes and could not drive piles; and long before the end of that century Ravenser Odd had entirely disappeared, many of its inhabitants going to Kingston-upon-Hull, the new port that inherited and still maintains the old rivalry with Grimsby. And the rivalry is still principally for traffic with inland and distant places—not for any local requirements.

It has been assumed, perhaps rather easily, that the 'Old Den,' a stony bank west of Spurn Point, and sheltered by it from the sea, is the site of Ravenser Odd. If the travelling beach on which that town stood was formed under conditions similar to those which formed the modern beach and Point, the old site of Ravenser Odd might be looked for at a distance of several hundreds of yards to the east or seaward of the modern Point. But there is no evidence of this. It may be possible that the materials of the destroyed island were transported westward and heaped up to form the Old Den. But, although the Old Den is so far to the west of the place where we might expect to find the site of Ravenser Odd, that situation may not be quite impossible. I will offer a suggestion to those who may be of that opinion. An examination of the beautiful order in which the shingle is arranged at the extreme point at Spurn impresses one with the notion that the direction of its growth is the result of constant struggles between the tides and storms of the North Sea and those of the Humber, the line of least resistance being followed by the advancing shingle even to an inch. Let us consider the conditions that existed when the thirteenth century spur was growing out from the shore.

The water area of the Humber, with all the inlets and marshes that were overflowed at high tides seems then to have been about 400 square miles. It is now only 110 miles, so that 290 miles have been taken from it by embankments, and these areas no longer receive and return the tidal waters. The tide flowing into the Humber encounters another considerable volume of water brought down by the rivers from the greatest drainage area in England, and the two volumes combined raise the Humber from low-water to high-water level. The capacity of the estuary must have been reduced by as much as a third through embankments and reclamation since the twelfth century, and the

proportion of river water to the sea water running out at the ebb tides is now very much greater than it was when Ravenser Odd was founded. If this difference is great enough to have any effect the current outward ought now to be stronger and to run longer in proportion to the current inward. The Point of Spurn may therefore now be directed further to seaward and may be outside the site of Ravenser Odd and the Old Den. But this is not confirmed by the latest Admiralty chart, which shows small portions inside and outside the Point covered with only one foot of water at ordinary low tides, so that the site of the lost town may as well be outside, where one would expect to find it, as within the Point.

Another suggestion which I make with some hesitation, may be worth considering. Before the end of the fourteenth century every vestige of Ravenser Odd had disappeared. In 1399 Henry IV. landed at 'Ravenser Spurn,' where a new spit of shingle must certainly have begun to jut out. When in 1471 Edward IV. landed at the same place the spit would have made considerable progress, and a deep water channel must have formed behind it, otherwise the place presented no greater facilities for his landing than many parts of the Holderness coast nearer to York. Holinshead says that Edward landed 'within the Humber on the Holderness side, even in the same place where Henrie, Erle of Derby, after called King Henrie the Fourth, landed.' From 1399 to this present time there has elapsed a period of over 500 years, much more than sufficient for the formation of a bank of shingle of the present length. No doubt the formation of this bank, depending on storms and currents and a varying supply of shingle from the cliffs, must have been very irregular, and the long neck must at times have been overflowed and been reinforced. Smeaton said that the Point had advanced 280 yards from 1766 to 1771, a rate of about a mile in thirty years. Shelford* says that for 200 years the Point has extended 2,700 yards, a rate of $13\frac{1}{2}$ yards per annum. Lord Avebury, in his 'Scenery of England,' says that, from old maps and records the Spurn must have been entirely formed within the last 300 years. In 1622 Callis† said 'Of late years parcel of the Spurn Head, in Yorkshire, which before did adhere to the Continent, was torn therefrom by the sea, and is now in the nature of an island.' In 1676 Justinian Angell got a patent to put up lights because a broad long sand had been thrown up

* 'Transactions of Civil Engineers,' Vol. 28.

† 'Lectures on Sewers, Grays Inn.'

at the mouth of the Humber 'six or seven months before.' The chart of Captain Greville Collins, hydrographer to Charles II.—said to be of 1684—shows the point very much shorter than at present. This was the first serious attempt at accuracy; I do not know how far it was a success. Pickwell, in 'Transactions of Civil Engineers,' Vol. 51, says that, from his measurements, the Point progressed southward 60 yards between 1864 and 1875, or 5·4 yards per annum. Its alternate growth and destruction seems to be intermittent rather than periodical, but it is often rapid. From all this there seems to be a possibility that, between the destruction of Ravenser Odd and the formation of the present bank of shingle, a new and distinct Spurn Point was thrown out and destroyed. This is a question perhaps worth the consideration of engineers familiar with the behaviour of travelling beaches.

There is another point which arises out of the conclusions of Smeaton and more recent writers that the bulk of the hard débris from the Holderness cliffs is carried along the Lincolnshire coast as far as the Wash. How does this material get across the deep channel that exists immediately beyond the Point? Let us suppose a breach to be established near to Kilnsea; a deep channel will be formed and all the land that may have accumulated where the Sunk Sand and Trinity Sand now exist, and where the 'Lost Towns' formerly stood will be swept away. Then the new channel will become a main channel and will cut off the supply of shingle to the rest of the Point; the current beyond the Point will become weaker and the accumulation of shingle will begin to be transferred to the Lincolnshire coast, and in time the old Point will disappear. Meanwhile the new Point will be driving the new channel (with the shingle to the south of it) further outward until it reaches something like its present position, when the process may be again repeated.

I suppose that during the last century there was some chance that this might happen. In 1820 Hewett's chart shows the neck overflowed at high tides. In 1849 there was a large breach through the Neck. The construction of groynes has prevented further mischief, but it has deprived this generation of an instructive illustration of tidal action and of ancient history.

BIRDS.

Goldfinch on Sledmere Hill.—On 25th March 1904 my wife and I saw a pair of Goldfinches, which I believe are rare in the district.—Rev. E. P. BLACKBURN, Driffield.

ON THE NESTING HABITS OF THE ROOK.

W. GYNGELL,

Scarborough.

THE interesting notes on the nests of Rooks (*Corvus frugilegus*) by Mr. E. A. Woodruffe-Peacock in the May issue of this journal tempt me to give my own experiences with this bird's nests. I find from my notebook that I have climbed up to and examined fifty-five nests containing eggs, besides many more containing young, and also empty nests in Yorkshire, Lancashire, and Southern Counties. These nests were built at heights ranging from those in hawthorn bushes at not more than twelve feet above the ground to those occupying the tops of the tallest forest trees, sixty to seventy feet in height.

The materials employed, besides the sticks (which seem to be always pulled from *living trees* at a little distance away from the rookery) are moss, grass, dead leaves, horse dung, large feathers, etc. I have never found a nest containing any wool. The nests vary greatly in size and strength, and may measure as much as four feet in height by three feet in diameter. These very large nests, the result of several years' work, when built in the strong fork of a tree are so substantial that I have actually sat on one with my whole weight in a tree top during a gale of wind. Others, and these form the majority, are so fragile that they are soon blown to pieces by a stiff breeze, whilst others again are so ill fixed in position that they slip out of the supporting branches and fall bodily to the ground. In the Valley Park, Scarborough, there were about two hundred and fifty nests last summer, and of these only a dozen remained when rebuilding commenced again this spring.

In this rookery nest-building, properly so called, begins in February, the 18th of that month being the earliest date noted. The birds work at the nests at all hours of the day and until quite dusk in the evening. The cock bird feeding the sitting hen often gives rise to the supposition that there are young in the nest at a very early date.

Nest-building or repairing, properly so called, I have never seen actually take place in the autumn, when the birds frequently assemble at the rookery, poke about the nests and occasionally take sticks into them, sometimes from one nest to another, but

never have I seen a bird pull a living twig from a tree, as is, I think, their invariable custom when building in spring. Of course I am familiar with the pretty fancy that rooks repair their nests in autumn in order that they may withstand the winter gales, but although I have watched their autumn work on many occasions I have never seen anything but a sort of toying with the nest. 31st October and 17th November I may mention as actual dates when the birds have been seen at nest-play. Living trees are generally, but not invariably, selected to support the nest. I have seen young reared in a nest built in a perfectly dead poplar tree in a garden. I have counted thirty nests in one tree. Want of sagacity seems very apparent in the nest-building of some birds. On an estate near Scarborough where there are high trees, both conifers and deciduous, supporting other rookeries, a small colony occupies a lot of hawthorn bushes, the nests being not more than twelve feet high. One year a pair of birds built a nest in a large tree in our Valley Park so close to the Valley Bridge that errand boys constantly harassed the birds by tossing stones into the nest and breaking the eggs. After repeated efforts the nest owners reared an odd young one, but, failing to profit by experience they re-occupied, but without repairing, the same nest the following season and with no better results.

The birds of each local rookery seem to have their own regular time for nest-building, and what appears to be *one large rookery* may really be *several smaller rookeries* in close proximity. Thus, all the nests at one end of a plantation may be finished before building has fairly commenced at the other end. Strange to say, the earliest builders I know in this district occupy a few isolated trees in an exposed position near the high cliff top.

During the whole time of nesting, from March till July, the Rooks cast up pellets which may be found on the ground below the trees. I have examined these pellets from different rookeries and in different years and find them to be composed almost entirely of corn-husks and coarse grit. Rooks have eggs in the nest generally by the last week in March; four or five are usually laid, but nests often contain six eggs. Average weight of an egg, .56 oz. 10 % of the eggs are marked chiefly at the smaller end.

Although as noted above, I have never found a Rook's nest containing wool, all the Carrion Crows' nests (about thirty) examined have been well lined with wool.

YORKSHIRE NATURALISTS AT BUCKDEN.

BUCKDEN, in Upper Wharfedale, proved a most suitable place for the 182nd meeting of the Yorkshire Naturalists' Union on August Bank Holiday week-end, and a large and representative gathering of Yorkshire naturalists took part in the investigation of that charming district. The ten-miles' drive from Grassington Station placed the members in a district but little 'improved' for the convenience of the tourist, and whilst the resources of the one inn and the houses around were necessary for the accommodation of the party, any little inconvenience there might have been was more than compensated for by the natural grandeur of the hills and gills and streams and woods, where it was possible to wander all day without being reminded of pills and soaps and tonics.

Most of the members having arrived on the Friday night, on Saturday an early start was made for Oughtershaw Hall, Langstrothdale, where the Rev. Trevor Basil Woodd acted as guide, and conducted the members to the tarns on Oughtershaw Moor (near to which the Cloudberry grows in unusual abundance and perfection); and round the beautiful natural gardens along the sides of Oughtershaw Beck, behind the Hall. The party was entertained to tea at the Hall, and also inspected a collection of paintings of the local flowers and fungi, by the Rev. C. H. B. Woodd and the Misses Woodd. These received deserved praise. The drawings of the fungi have already been referred to in 'The Naturalist.'*

On the following day the members, young and old, ascended Buckden Pike by way of the gill behind the village, under the able leadership of Mr. Harold Wager, F.R.S., who piloted the members 'o'er craggy ways' and 'gentle slopes' to the summit, from which a glorious view of the surrounding country was obtained.

Miss Crompton-Stansfield having given permission for her estates to be visited, advantage of this was taken on the Monday. The grounds proved to be most interesting from all points of view, though the botanists probably were the most fortunate in their discoveries. A brief glimpse was obtained of the herd of Fallow Deer in the park—a reminder of the times when all the district was famous for its ancient forest of Langstrothdale Chase, and Buckden got its name.

*May 1891, pp. 140-142.

The usual business meeting was held on Monday evening, under the presidency of Mr. A. H. Pawson, J.P., whose presence at and interest in the meeting throughout had so materially assisted in ensuring its complete success. At this meeting various reports were presented, particulars of which appear

*Photo by]***Oughtershaw Hall.***[Miss Woodd.*

below. Towards midnight the whole party turned conchologists, and assisted Messrs. Roebuck and Taylor in tracing the destroyers of the Black Currants on the wall at the end of the inn—a fact first discovered by an old but energetic member—their competitor!

For Geology Mr. Cosmo Johns writes that the district, despite its regularity and absence of dislocations, was very

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interesting and—to one familiar with the Carboniferous rocks in other districts—the splendid sections of the Yoredale rocks were very striking. During the first and second days' excursions the large amount of glacial drift on the banks of the Wharfe and Buckden Beck was very noticeable. The boulders examined were all local in character, thus confirming the views of previous workers that the ice which had left such distinct evidences of its work, was certainly not foreign. As pointed out by Mr. Sheppard, a characteristic of the drift in several places was the fact that, owing to the large quantity of comminuted lime-

*Photo by]**The Tarn, Oughtershaw Moor.**[Miss Woodd.*

stone in it, the exposure to atmospheric influences had caused it to harden into a concrete-like mass, very different from the ordinary boulder clay.

The character of the Yoredale rocks which forms a large part of the sides of the dale, consisting of limestone with shales and sandstone between, with the massive Great Scar or Mountain Limestone at the base and the Millstone Grit capping it, will no doubt explain many of the facts recorded by the Botanical Section as to the limits of certain plants.

From the notes sent by Mr. Snelgrove the following are worth noticing :—

On limestone only :

<i>Thalictrum minus</i> .	<i>Pinguicula vulgaris</i> (Butterwort).
<i>Parnassia palustris</i> (Grass of Parnassus).	<i>Carduus heterophyllus</i> (Melancholy Thistle).
<i>Arenaria verna</i> (Vernal Sandwort).	<i>Carlina vulgaris</i> (Carlina Thistle).
<i>Saxifraga tridactylites</i> .	<i>Geranium pratense</i> (Meadow Cranesbill).
<i>Galium sylvestre</i> .	
<i>Poterium Sanguisorba</i> (Salad Burnet).	<i>Helianthemum vulgare</i> (Rock Rose).

On Millstone Grit :

<i>Rubus Chamæmorus</i> (Cloudberry).	<i>Calluna vulgaris</i> (Common Heather).
<i>Erica cinerea</i> (Purple Bell Heather).	<i>Digitalis purpurea</i> (Foxglove).

If one had to mention one thing as the striking feature of the visit it would be the splendid appearance of Buckden Pike as seen from the Deer Park on Monday ; the Great Scar limestone with its fine escarpment ; the Yoredales with each limestone stratum standing out clearly, and the grit on the top weathered back, while deeply cutting into the face could be seen the tumbling waters of Buckden Beck, the whole forming a fine picture.

For the Vertebrate Section Mr. H. B. Booth, M.B.O.U., writes :—All bird life was exceedingly quiet, as is usual at this season of the year, when the young and old birds together keep as silent and as much under cover as possible, until such time as the tender offspring are better able to take care of themselves. The exceptions were the Swallow tribe, all three species of which were abroad with their first broods, and at places in the valley the air appeared almost full of them. The old birds were frequently noticed collecting feathers in the air for the linings of their second nests. In all 57 species of birds were noted, of which 17 species were summer migrants. Perhaps the most interesting seen were the Woodcock in the Deer Park Wood, and the Pied Flycatcher noted on the upper side of Starbotton, which is much higher up Wharfedale than we have heard of it before. The Kingfisher, many Dippers, and several families of the beautiful Grey Wagtail were about the infant river. In the Raptores the Kestrel (fairly common) and the Sparrow Hawk were seen, and a pair of the latter which had recently fallen to the keeper's gun were inspected. The Long-eared, the Barn, and the Tawny Owls occur in the district—the latter species being the most numerous and was the only one seen on the excursion. The tiny Goldcrest was fairly common in the fir wood near Hubberholme, where it breeds. The main party

reported seeing a Teal and a flock of Golden Plovers on the moors, and another party came across several Curlew and Black-headed Gulls. Numerous Herons were also seen and would probably belong to the heronry near Gargrave.

From a conversation with the intelligent gamekeeper (Mr. Thomas Camidge) we feel certain that the Greater Spotted and the Lesser Spotted Woodpeckers occur in the Deer Park Wood. This latter will be a very interesting record if it can be verified. We noticed the borings of the Woodpeckers on the trees, but were not fortunate enough to meet with either species. The Coal Titmouse and Marsh Titmouse were both met with.

Quite a feature of the visit was the number of House Martins' nests on the steep face of Kilnsey Crag. They are rapidly increasing yearly in numbers, and perhaps these cliff-building House Martins may partly account for the decreasing numbers noticed in the suburbs of our larger towns during recent years. Two of our number endeavoured to count the nests on the face of the Crag, and came to the conclusion that there would be at the least 150 nests. The tenanted nests were properly domed and quite typical, and not 'open' nests, as has been asserted elsewhere.

Other birds of the same species were breeding quite freely under the eaves of the houses in the surrounding villages—in fact, I never remember seeing more House Martins in a single day, excepting, of course, when they are migrating.

No particular look-out was kept for mammals, and the Squirrel, Rabbit, Hedge-hog, and Stoat (rather abundant), together with the graceful herd of Fallow Deer in the park, were apparently the only species noticed.

Apart from this excursion it is worth recording that the gamekeeper shot one of a pair of Ravens on the moor near Buckden about the end of May of this year. He gave it to the driver of the mail-cart (Paul Kelly, of Skipton), who had it set up. Mr. Ross Butterfield called to see this bird on his way home, and reports it a very fine bird, though scarcely mature. During the summer of 1903 a Hooded Crow was noticed in this district, and on 22nd May of this year one was shot near Grassington, which on dissection proved to be a female. Another was noticed about the same time.

It should be worth repeating that a Golden Eagle was killed by the river watcher at Starboston two years ago. It was stuffed in Bradford and is now in Kettlewell. It was apparently a bird of the third year, and when killed was in a very emaciated

condition, with a rabbit trap firmly fixed upon one of its feet, and had been a target for all the local gunners for several weeks before its capture.* Every autumn several Rough-legged Buzzards are shot in this district, and the Peregrine Falcon pays periodical visits.

We were informed that Miss Crompton-Stansfield had given orders to her head keeper not to shoot any of these noble birds. This was good news, and we sincerely trust it is true and that it will be carried out. We should like to hear of Miss Stansfield extending her kind sympathy to all the birds of prey in her domain, and particularly to the Kestrel and the Barn Owl, which are such good friends to the farmers.

Mr. W. Denison Roebuck, F.L.S., writes :—Bats were reported by members, but the species not ascertained. Molehills were noted on the summit of Buckden Pike and elsewhere. A Shrew was caught by Mr. Petch in Buckden Gill at about 900 feet altitude, which on examination proved to be the Common Shrew, and no doubt the small mammal which was seen at the Ordnance Cairn on Buckden Pike summit would probably be the same. Rabbits were in abundance; a Mole was seen at the bottom of Buckden Wood. The keeper's gibbet there contained Weasels, and a Stoat was seen by Mr. Ross Butterfield. A dead Hedgehog in Buckden Wood completed the list of mammals. Of reptiles Mr. Taylor saw the Common Lizard on Oughtershaw Moor at 1,850 feet altitude, and Frogs were seen there also. A Toad was seen on the road south of Buckden by Mr. Ostheide at night. Of fishes there were Sticklebacks in a backwater of the Wharfe near Buckden, and plenty of Trout in the river; and the Miller's Thumb or River Bullhead was common in Buckden Beck and Cray Beck.

The Rev. J. E. Tarbot adds that he ascended Buckden Pike, and about half way up saw a Hobby (*Falco subbuteo*). Afterwards while sitting down to lunch I saw it again. This time it rested on the ground quite close to me for a few seconds. I feel quite confident of the species, though I believe it is scarce in Yorkshire. Its long swallow-like wings and flight alone single it out from any other British Hawk.

Mr. A. S. Tetley supplies the following list of Lepidoptera, which, among others, were taken or observed on the excursion :—

* See 'Naturalist,' March 1903, p. 92.

Nudaria mundana.

On stone walls near Hubberholme.

Hepialus sylvinus.

One female netted near Buckden.

Xylophasia rurea.

Hadena adusta.

Plusia pulchrina.

All netted at dusk in road leading to Cray.

Ellopiopsis prosapiaria.

Larentia viridaria.

Both in Buckden Wood.

Melanthia ocellata.

In Buckden Wood.

Larentia cæsiata.

Common on high ground at rest on limestone rocks.

Cidaria immanata.

Cidaria fulvata.

Netted at dusk in Cray Road.

Tanagra atrata.

Common all over the district.

Coremia munitata.

One ♀ at rest in Buckden Wood, close to Hubberholme.

This was the best thing found.

While staying at Linton-in-Wharfedale the Rev. J. E. Tarbot took the following species of Lepidoptera among others:—

Erebia æthiops (blandina).

Common (Grassington), first taken 23rd July.

Nudaria mundana.

Common everywhere.

Larentia cæsiata.

Very common on Oughtershaw Floss; less common Thorpe Fell.

Larentia olivata.

Gordale Scar, Malham, and one in Troller's Gill, Appletree-wick.

Cidaria pyraliata.

Tanagra atrata.

Aplecta nebulosa.

Plusia pulchrina (V-aureum).

Plusia iota.

Abrostola urticae.

Mr. G. T. Porritt, F.L.S., reports:—The couple of hours or so I had along the river and in the wood opposite to the village of Buckden were of course not at all sufficient to show what the district would produce in Neuroptera and Trichoptera. The time of day too (noon), was just the period when these insects are least in evidence. Still there was an abundance of specimens, if few species. The most interesting taken was the local and very pretty *Leptocerus bilineatus*, for which Castle Howard was our only previously recorded Yorkshire locality. Another local species was *Lasiocephala basalis*, but it was already well known as an abundant Wharfe insect at Grassington. Less noteworthy species included *Polycentropus flavomaculatus*, *Tinodes Wæneri*, *Agapetus comatus* in abundance, *Isopteryx tripunctatâ*, *Nemoura cinerea*, etc.

For Botany Mr. J. F. Pickard reports that the district was found to be very rich in sub-Alpine plants, and a great deal of interesting work was done. But some, principally limestone species, such as *Geranium sanguineum*, *Hippocrepis comosa*, and *Rhamnus catharticus*, so plentiful between Grassington and Kettlewell, were noticeably absent at Buckden and Oughtershaw. Diligent search was made for *Polygala austriaca*

var. *alpina*, but without success, though he was glad to find *Helianthemum vulgare* var. *discolor* Reich. in Cray Gill. The orange blotches at the base of the petals of this newly-described British form* were very distinct, while the type, *H. Cistus*, with its pure yellow flowers was found in the same neighbourhood much more plentifully.

The plantations of Buckden Park, though developing many shade-loving plants, could not be expected to yield as many species as the more natural woodland, but the higher gills on both sides of the valley amply repaid a visit. *Pyrola rotundifolia* was seen growing in its only West Riding station near Oughtershaw, and in the same gill a few more species were noticed. All the higher gritstone hills above 1,500 feet revealed enormous quantities of the Cloudberry (*Rubus chamaemorus*), with its rich coloured fruit, so attractive in appearance. At Oughtershaw the abundance of this Mountain Raspberry was striking. The total absence of Gorse, Broom, and Juniper on any of the hills was also remarked, but the average altitude is too high for either of the two former, and the only station known in Wharfedale for Juniper is Hesletine Gill. On the old lead-workings of Buckden Pike *Thlaspi alpestre* var. *occitanum* was found to be abundant, growing with *Cochlearia alpina* and *Arenaria verna*, and Mr. Beanland found *Cardamine impatiens* (new to Langstrothdale) in plenty on the wooded western slope of the mountain. *Actea spicata* grows in more than one of the damp shaded gills, and about reaches its centre of distribution in England at Buckden. Amongst other species worth noting which were seen by the party are:—

Thalictrum montanum.

Trollius europæus.

Sagina nodosa.

Draba incana.

Geranium sylvaticum.

Geranium pratense.

Geranium lucidum.

Anthyllis vulneraria.

Prunus Padus.

Rubus saxatilis.

Epilobium angustifolium.

Myriophyllum alternifolium.

Sedum villosum. Beckermounds.

Saxifraga geum. Park Gill,
probably introduced.

Saxifraga hypnoides.

Parnassia palustris.

Drosera rotundifolia. Only near
Oughtershaw Tarn.

Galium Mollugo.

Galium sylvestre.

Scabiosa Columbaria.

Inula dysenterica. An extension
of upper range to 900
feet.

Carduus crispus.

Cnicus heterophyllus.

Hieracium anglicum (teste Dr.
Lees).

Hieracium murorum.

Hieracium tridentatum.

Campanula latifolia.

* 'The Naturalist,' February 1903, pp. 45-46.

Vaccinium Vitis-idaea.
Vaccinium oxycoccos.
Primula farinosa.
Trientalis europæa. Kirk Gill,
 plentiful.
Gentiana campestris.
Melampyrum sylvaticum. As
 high as Oughtershaw.
Polygonum viviparum. Cray
 Gill.
Salix phylicifolia and its var.
Laurina.
Salix pentandra.
Empetrum nigrum.
Epipactis atro-rubens. One
 specimen.
Epipactis palustris.
Orchis latifolia.
Habenaria conopsea.
Habenaria viridis.

Polygonatum officinale. Just
 below Buckden.
Convallaria majalis.
Paris quadrifolia.
Scirpus Caricis.
Carex pallens.
Sesleria cærulea.
Asplenium viride.
Asplenium trichomanes.
Asplenium ruta-muraria.
Scolopendrium vulgare.
Cystopteris fragilis.
Polystichum aculeatum.
Polypodium calcareum.
Polypodium phegopteris.
Ophioglossum vulgatum.
Botrychium lunaria.
Equisetum maximum.
Equisetum sylvaticum.
Lycopodium selago.
Selaginella selaginoides.

Mr. R. H. Philip writes:—Leaf-fungi were not very numerous; in fact, the dry weather this year has diminished their growth everywhere. The following were gathered:—

Puccinia glomerata Grev. Teleuto
 spores on Ragwort.
Puccinia hieracii Schum. Uredo
 spores mixed with very few
 teleuto spores on the 'Melan-
 choly Thistle.' This is, I think,
 a new host plant for this species,
 which, however, attacks a
 variety of Thistles and Hawk-
 weeds.

Uromyces alchemillæ Pers. On Lady's
 Mantle.
Coleosporium campanulæ Pers. On
 Hairbell.
Melampsora farinosa Pers. On Sallow.
Triphragmium ulmarie Schun.
 Uredo spores on Meadow Sweet.
Urocystis anemones Pers. On Ran-
 unculus repens.

Mr. T. Petch, B.Sc., B.A., writes:—Eighteen species of Mycetoza were found, most of them in Buckden Wood on the third day. The ground covered on the first two days was generally unfavourable, though it had been expected that the mosses in the gills would yield some of the rarer species which have been recorded from such localities. *Enerthenema elegans* Bowm. was found in a small fir plantation on the ascent to Oughtershaw Tarn, and *Comatricha obtusata* Preuss, *Trichia botrytis* Pers., *Arcyria incarnata* Pers., in a wood on the east side of Cray Gill. In Buckden Wood, immediately opposite Buckden, occurred *Ceratiomyxa mucida* Schrœt. in abundance on decayed wood, *Fuligo septica* Gmelin on pine needles, *Stemonitis fusca* Roth., *Comatricha obtusata* Preuss, *Cribraria argillacea* Pers. covering a square yard of pine chips, C.

aurantiaca Schrad., *Dictydium umbilicatum* Schrad. common, *Arcyria incarnata* Pers. common, *A. flava* Pers. very abundant, *A. punicea* Pers., *A. albida* Pers., *Trichia varia* Pers., *T. botrytis* Pers., *T. fallax* Pers. abundant, *T. persimilis* Karst., *Reticularia lycoperdon* Bull., *Lycogala miniatum* Pers. The occurrence of so many species in a small area at the same time indicates a mycetozoan fauna somewhat above the average.

Mr. Philip reports :—The river Wharfe and tributary streams in the valley yielded the following species of Diatoms :—

<i>Achnanthes microcephala.</i>	<i>Gomphonema gracile.</i>
<i>Amphipleura pellucida.</i>	<i>Gomphonema intricatum.</i>
<i>Cocconeis pediculus.</i>	<i>Gomphonema montanum.</i>
<i>Cocconeis placentula.</i>	<i>Navicula amphispæna.</i>
<i>Cymbella cistula.</i>	<i>Navicula radiosa.</i>
<i>Cymbella Helvetica.</i>	<i>Nitzschia linearis.</i>
<i>Cymbella lanceolata.</i>	<i>Rhoicosphenia curvata.</i>
<i>Cymbella obtusa.</i>	<i>Synedra amphicephala.</i>
<i>Encyonema cæspitosum.</i>	<i>Synedra pulchella.</i>
<i>Gomphonema geminatum</i> (our largest British freshwater diatom).	<i>Synedra Ulna.</i>
<i>Gomphonema constrictum.</i>	<i>Synedra Vaucheria.</i>

In addition to some of the above the gills on Buckden Pike contained the following species :—

<i>Diatoma hiemale.</i> Very plentiful and entirely typical. The var. <i>mesodon</i> , which is most common in the West Yorkshire district, was not found at all. At the recent Hebden Bridge excursion these conditions were reversed.	<i>Melosira arenaria.</i> <i>Navicula gracilis.</i> <i>Nitzschia dubia.</i> <i>Nitzschia sigmoidea.</i> <i>Pleurosigma attenuatum.</i>
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T. S.

NOTES ON *BLETHISA MULTIPUNCTATA* L. AND OTHER GEODEPHAGOUS BEETLES.

E. G. BAYFORD,
Barnsley.

EIGHTEEN years ago the first sheet of the Rev. W. C. Hey's 'List of the Coleoptera of Yorkshire' was published in 'The Transactions of the Yorkshire Naturalists' Union.' Since that event a number of coleopterists have arisen in various parts of the county, with the result that many of the records for species included in the list have been brought up to date, and the range of others has been found to be more extensive than there indicated. With regard to certain species all that could be

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demonstrated was that they had existed in the county fifty, sixty, or seventy years ago. Now we know that many of them still occur and in localities of which the older coleopterists knew nothing. Mr. J. W. Carter, F.E.S., has drawn attention (ante, pp. 148-150) to some of these. Another striking instance is that of *Blethisa multipunctata* L. Respecting this species Messrs. Johnson and Halbert, in their 'Beetles of Ireland,' say it is a northern species occurring over Northern and Central Europe, Siberia, and in North America.* They further state that in Ireland it is found in Ulster, Connaught, Leinster, and Munster. It is 'rare, frequents very marshy places, and unless the season is a dry one it is usually difficult to obtain.' In France it occurs in the North and South-west, and in Anjou. Its distribution in Great Britain, so far as recorded by Samouelle, Stephens, Dawson, Fowler, Edwards, Ellis, and Morley, is as follows:—

SCOTLAND: Rare and local; less frequent than in England. Lowlands, also taken at Braemar.

ENGLAND: *Near Carlisle; Liverpool district, near Crosby; Askham Bog, York; Repton, Lincoln; Norfolk, Suffolk, Essex, rare in the London district; common on Whittlesea Mere and in the Cambridgeshire Fens; Slapton Ley, Devonshire.*

The localities printed in italics are ancient records, and it would be well if coleopterists in their respective counties would endeavour to find whether the species is still to be found in its former haunts. So far as Yorkshire is concerned this has now been done. In Mr. Hey's list there are only two records, dated 30th November 1830 and 16th May 1836, both referring to Askham Bog. Indeed, Mr. Hey says of it: 'Another of the Askham Bog rarities, but not taken for many years.' In the cabinet of specimens collected and arranged by W. Spence (joint author with Rev. W. Kirby of 'An Introduction to Entomology'), now in the Hull Museum, there are several specimens which may have been taken in the Hull district, but in the absence of any evidence this can be no more than a surmise.

On 7th November 1902, while rambling with Mr. G. Parkin, of Wakefield, and Mr. W. Hewett, of York, we came to Ryhill reservoir, a large sheet of water about four miles from Wakefield

* I am inclined to think that for 'species' we should read 'genus.' So far as North America is concerned I am not aware that this species does occur there, but the genus is represented by *B. quadricollis* Hald. and *B. julii* Lee.

and eight from Barnsley. A beetle running on the ground attracted my attention. A few hurried movements and it was in a glass-top box, which enabled me to see at a glance that I had got a new species, so far as my knowledge of local distribution went. To make sure that it was *Blethisa* was not a difficult task. Although Messrs. Parkin and Hewett assisted me in my search we saw no more; and a further visit in the spring of the following year was equally fruitless. On Whit Thursday, 25th May, in very indifferent weather, another search was made. Fortunately I discovered its haunts and, what is more, some of its habits. As these do not seem to have been recorded it may be as well to set them down for future guidance.

The late Mr. Gregson found it in company of *Elaphrus*. Now at Ryhill both *E. riparius* L. and *E. cupreus* Duft are extremely common, but *Blethisa* most certainly was not in their company, although not far away. Most coleopterists will have noticed the preference of *Elaphrus* for more or less bare patches of ground exposed to the rays of the sun. So far as I could see *Blethisa* avoided these bare patches, preferring to run about amongst the short grass whilst the sun shone, and retiring amongst the damp debris and flood refuse when the sun was overcast and rain falling. Most of the specimens were taken by carefully sifting this flood refuse during the rain.

Blethisa appears to take short flights at rare intervals, for although I never by any chance saw one take to wing I noted on two occasions one alight and rapidly close its wings. A later visit on 5th June, a typical day for such species, very hot with bright sunshine revealed its presence in other parts of the same locality, the places where I had previously taken it being entirely submerged, an effect of the heavy rains of the previous week. Though *Blethisa* is not an aquatic species it does not hesitate to rush out on the surface of the water.

Amongst other captures was a single specimen of *Anchomenus marginatus* L., of which Mr. Hey says:—‘There is only one record of the capture of this well-marked species in Yorkshire, viz., 2. N.E. Scarborough, Jan. 1839, ‘taken in the immediate neighbourhood’ (W.K.B.).’

Although this is the first specimen I have taken, several have been taken in this district, at Worsborough reservoir, in 1883, by Mr. C. Bellamy, and again in 1900 by Messrs. Walmsley and Whitaker. It has also been met with in the Doncaster district by Dr. Corbett, and is included in Mr. Russell’s list of beetles taken in the Hull district.

FIELD NOTES.

MAMMALS AND BIRDS.

Gamekeeper's Hoard near Scarborough.—At the meeting of the Yorkshire Naturalists' Union, held at Scarborough in May last, a gamekeeper's hoard was noticed at Suffield containing the following:—Ten Magpies, two 'Norwegian Crows,' five Carrion Crows, one Kestrel, four Jackdaws, 29 Weasels, one Stoat, and a Cat's tail.—T. S.

BIRDS.

Occurrence of the Kentish Plover at Teesmouth.—On 8th June 1902, Mr. C. Braithwaite, of Seaton Carew, when near the North Gare Breakwater, noticed amongst a flock of the small migratory Ringed Plovers a bird of smaller and lighter build, with no distinct wing bars, which uttered a note somewhat like a Sanderling's. A close approach to the stranger, in order to note the distinctions in plumage, was out of the question, as its companions were as usual wild. Mr. T. H. Nelson was apprised of its appearance, and we looked for it on the day following, but without success, and its identity remained uncertain. On 20th May of the present year, however, Mr. Braithwaite, when near the same place, saw a bird in company with two breeding Ringed Plovers, which uttered exactly the same note as the individual previously noticed, and after separating it from its congeners he had no doubt as to its being identical with the 1902 bird, except that the patch on the neck was not so dark. It was afterwards found dead near the breakwater, and proves to be an adult female Kentish Plover, which is, as far as can be ascertained, the first example for Durham.—C. E. MILBURN, Middlesbrough.

SPIDERS.

Records of Yorkshire Spiders.—In the recently-issued paper 'On New and Rare British Spiders,'* by the Rev. O. Pickard Cambridge, three species are, by some mischance, wrongly stated to have been taken in Yorkshire. As at some future date a list of our county's spiders will doubtless be compiled, it will be as well, in order to prevent the perpetuation of the error, to make the necessary corrections in the pages of 'The Naturalist.' *Styloctetor penicillatus* Westr. and *Tapinocyba subitanea* Cb. were captured near Hexham in August 1902, and *Oxyptila sanctuaria* Cb. on Conway Mountain and at Gogarth, in North Wales, in August 1901.—WM. FALCONER, Slaithwaite.

*Trans. Dorset. Field Club.

HYMENOPTERA.

Lincolnshire Galls.—At a meeting of the Lincolnshire Naturalists' Union at Little Bytham, on the 24th June, the following interesting galls were taken in Holywell parish, on Lincolnshire Limestone:—*Aulax glechomæ* Htg. on *Nepeta glechoma*, very common on one hedge bank. *Phyllocoptes Thymi* Nal. on *Thymus Serpyllum*. *Adelges abietis* L. on *Abies excelsa*. *Cecidomyia marginem-torqueno* Wtz. on *Salix viminalis* L. *Cecidomyia veronicæ* Bremi. on *Veronica Chamædrys* L. *Cecidomyia Ulmarie* Bremi. on *Spiræa Ulmaria* L., very common, the galled leaves on the Boulder Clay were also attacked by that beautiful orange fungus *Uromyces Ulmarie*. On Boulder Clay—*Eriophyes macrorhyncus* Nal. on *Acer campestre* L. *Eriophyes Avellanæ* Nal. on *Corylus Avellana* L. *Spathogaster baccarum* L. on *Quercus pedunculata*. An unnamed gall on *Galium uliginosum* was also taken.—S. C. STOW, Grantham.

LEPIDOPTERA.

The Striped Hawkmoth near Huddersfield.—Mr. John Bedford, of Kirkburton, has kindly given me a good specimen of *Deilephila livornica* found at rest in a garden at Rowley Hill, near Huddersfield, on 30th May 1904. It appears to be almost 50 years since this species was recorded for the Huddersfield district.—B. MORLEY, Skelmanthorpe, 4th July 1904.

COLEOPTERA.

***Geotrupes typhæus* in the Lake District.**—This beetle has been but seldom recorded for the North of England, but it is plentiful in some parts of Cumberland and Lake-Lancashire. During the first week of April this year I found it abundant in the pastures of the Esk Valley near Boot and on the fell sides near Butterilket Farm. Here, as well as in the pastures at Wastdale Head, in the Duddon Valley at Seathwaite, and on the fell sides near Walna Scar and Seathwaite Tarn I constantly saw fresh burrows in close proximity to sheep-dung. In Wrynose Pass I picked up the casting of some large bird of prey—probably a Common Buzzard—which was composed almost entirely of the remains of this *Geotrupes*.—CHAS. OLDHAM, Knutsford, 5th May 1904.

CRUSTACEA.

Crustacea at Withernsea.—*Nyctiphanes norvegica* (M. Sars) was cast up at Withernsea on 8th April with the *Euthemisto compressa* previously recorded, but was by no means common, only five examples being found along three miles. Canon Norman has enumerated several Scotch records of this Northern schizopod but no occurrences on the English coast (Ann. and Mag. Nat. Hist., Ser. 6, Vol. 9, 1892, p. 460). The only other crustacea found on the tide-mark were three specimens of *Haplonyx cicada* (Fabr.), and this was also common in the fishing boats and on dead Gurnards from the crab pots. In the fishing boats were also found *Amathilla homari* (Fabr.), *Callisoma hopei* A. Costa, *Idotea linearis* (Penn.), *Nænia excavata* Spence Bate, several large *Hyas araneus*, and an abundance of *Pandalus annulicornis* Leach. *Limnoria lignorum* (Rathke) inhabits the piles supporting the sewage pipe. The beach on this occasion was of the normal Holderness type: a level stretch of sand covered the site of the boulders from which most of the specimens listed in the January 'Naturalist' were obtained.—T. PETCH, 27th April 1904.

FLOWERING PLANTS.

Variations in Hawthorn.—On the south side of the valley, and within the parish of Haugham, which separates the parishes of Tathwell and Haugham, is a very high Hawthorn hedge about 100 yards in length. On 5th June I examined a considerable number of flowers along the whole length of this hedge and found, with the exception of one bush, all were 'one-styled' (var. *monogyna*). Each inflorescence of the one bush had both the one-styled and the two-styled flowers; and in one inflorescence I found one flower with three styles. With the exception of some of the foliage being somewhat lighter in colour there was no difference in the general appearance of this bush from the other. With the object of ascertaining the proportion of the two-styled flowers to the one-styled flowers, I carefully examined ten inflorescences with the following result:—

Number of Flowers on Each Inflorescence.

One-styled...	8	...	8	...	2	...	4	...	9	...	8	...	4	...	13	...	10	...	10
Two- ,,	5	...	6	...	10	...	8	...	4	...	6	...	12	...	4	...	6	...	7
Three- ,,	—	...	—	...	—	...	—	...	1	...	—	...	—	...	—	...	—	...	—

It will be seen from this that nearly half of them are two-styled flowers.—C. S. CARTER, Louth, 7th June 1904.

Lincolnshire Plant Notes.—I have always considered *Erophila præcox* rare with us. This season it is in places in quantities on the Lincolnshire Limestone (Hibaldstow beds) walls in the village of that name. It is peculiarly selective in the localities it frequents. I took it also in March at Hose, Leicestershire, and have received it from Mr. H. Fisher, from Barnack, Northamptonshire, so there can be little doubt it is widely, if thinly distributed in Lincolnshire. *Thesium humifusum* is found in S. Lincs. 53, from Holywell, on the southern border, to Potterhanworth, just south of Lincoln, on the local limestone. It has not yet been discovered in N. Lincs. 54. *Gagea fascicularis* is one of the species recorded and found in Northampton and Rutland, which has not yet been recorded for S. Lincs. *Spiranthes autumnalis*, another rare and peculiar species, is found on the Lincolnshire Limestone at Ropsley and Stamford (both in Lincolnshire and Rutland), and in its earlier localities both in N. and S. Lincs.; on estuarine alluvium or warp.—E. ADRIAN WOODRUFFE PEACOCK.

MOSSES AND HEPATICS.

Yorkshire Mosses and Hepatics.—*Campylopus atrovirens* var. *muticus* Milde. This beautiful moss, vivid green above and black below, and usually considered a moss of mountainous districts, I found on bare peaty ground on Skipwith Common on 4th April, 1901. It is known in the 'Appendix to Vol. I. of the British Moss Flora' as var. *epilosus* Braithw. It is an addition to the 'Moss Flora of the East Riding,' and the variety is new to Yorkshire; tested by Mr. Dixon. *Dicranum scoparium* var. *orthophyllum* Brid. This I found at the foot of a hillock in Jackdaw Crag Quarry, Tadcaster, 14th May, 1903. *Weisia calcarea* var. *muticum* Boul. This very minute moss I found in a crevice of limestone rock in Jackdaw Crag Quarry, Tadcaster, on 16th March, 1900; tested by Mr. Dixon. *Nardia minor* (Nees). This small hepatic I found in Hebden Valley during the meeting of the Yorkshire Naturalists' Union at Hebden Bridge on 11th June, 1904. Students of hepatics may be interested to know that this species has many synonyms, the chief of which are *Nardia Silvrettæ* (the name in Pearson's great work on hepatics), *N. repanda*, *N. geoscypha*, and *N. hæmosticta*. Hence it appears that this has been a puzzling plant. Mr. Symers M. Macvicar has tested this plant.—WM. INGHAM, York, 15th August 1904.

REVIEWS AND BOOK NOTICES.

Mr. Fisher Unwin has just published 'Nature's Story of the Year,' by C. A. Witchell (5s.). This is written in a pleasant style, and is well illustrated by drawings of birds, etc., by Miss Witchell and Mr. Neale, as well



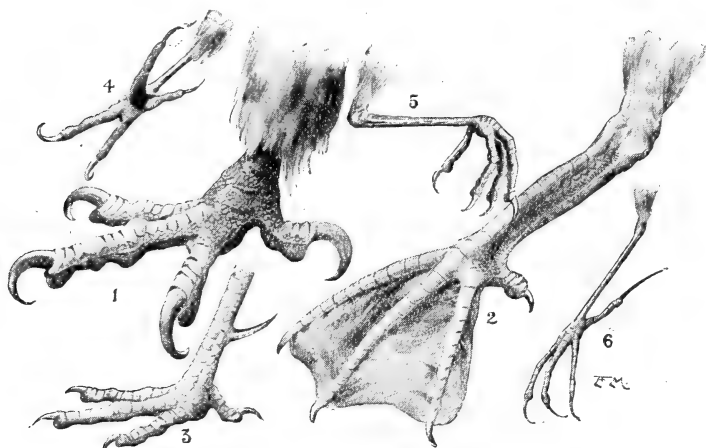
The British Adder.

as by blocks from photographs. One of these we are enabled to reproduce. The book is most suitable as a school prize for boys and girls, and as such can be recommended.

Of a somewhat similar character is 'Quiet Hours with Nature,' by Mrs. Brightwen, issued by the same publishers. Most of this had previously appeared in serial form in 'The Girls' Own Paper.' The authoress writes on a variety of topics, amongst which 'My Egyptian Jerboas,' 'Bobbie, the Barn Owl,' 'Ortolans,' 'The Horse Chestnut,' 'Eccentric Flowers,' 'Stag Beetle,' etc., etc., may be mentioned as giving an idea of the scope of the work. The writer is evidently a keen observer, and has been able to put her observations in a pleasant form. This volume, too, has numerous illustrations.

'Vegetable Thieves and Murderers' is the title of No. 3 of the penny handbooks just issued by the Bradford Botanical Garden. It contains a paper by Mr. T. Pawson describing the various insectivorous and parasitic plants now growing in the garden and greenhouses. The frontispiece consists of drawings of three insectivorous plants, viz., Venus Fly Trap, Pitcher Plants, and the Sun-dew. A second edition of publication No. 1 ('Descriptive Handbook of the Trees in Lister Park') already noticed in these columns (March 1902, p. 88), has also been published, the size being uniform with that of Nos. 2 and 3.

A new edition of the well-known 'Eyes and No Eyes,' by A. B. Buckley (Mrs. Fisher) has just been published by Messrs. Cassell & Co., and can be strongly recommended as a suitable gift for an intelligent child. It is



Feet of Birds.—1. Bird of prey—Eagle. 2. Web-footed—Goose. 3. Scratching—Pheasant. 4. Climbing—Woodpecker. 5 and 6. Perching—Missel-Thrush and Lark.

illustrated by no fewer than 48 coloured plates and other illustrations—one of which latter, reproduced herewith, may be looked upon as representative. The coloured plates are usually good—some are very fine indeed. The separate paging of the various six 'books' in the volume is a little confusing.

NORTHERN NEWS.

'A Sign of the Times.—A church has been converted into a museum under municipal control at King's Lynn' ('Museums Journal').

The annual meeting of the Barrow Naturalists' Field Club, recently held, showed that this society, established 28 years ago, had touched high-water mark, as regards membership and financial position. The membership is now over 300; 70 new members had been elected during the year, and the accounts show a balance in hand of £35. Mr. M. Stables was elected president for the ensuing year.

The boring for coal at Benniworth, near Louth, has been abandoned, at any rate for the present. It commenced in Kimeridge clay, which contains bands of inflammable shale, which possibly explains the reason for the bore. Great secrecy has been observed in reference to the boring, and geologists were not permitted to get any particulars. The probability is that had a reliable geologist been consulted much expense would have been saved.

In a 'Note on the Submerged Forest and Peat Beds at Redcar,' published in the Cleveland Club's Report (see p. 161), Mr. H. Simpson states—'At Seaton Carew, I am informed, the submarine peat beds have yielded antlers of the Irish Elk and a tusk of the Mammoth.' It would be interesting to get more details of the latter discovery, as so far we are without evidence of Mammoth remains in the peat of the East Coast. (See 'The Naturalist,' April 1904, p. 102.)

SEP 1904

Naturalist,

BOOKS, MAGAZINES, &c., FOR SALE.

MAGAZINES, &c.

- Annals and Magazine of Natural History**, v. 5, 1840 (bound); 5th ser., v. 15, 1885; 6th ser., v. 13 and 14, 1894.
British Association Reports, 1834-42-3-4-5-8-54-5-6-7-8-9-60-1-2-3-4-5-7-8-9-70-1-2-3-5-6-7, 1879 to 1901.
British Naturalist, April and August 1893; January 1894.
Entomological Society's Proceedings, 1885, 1886.
Entomologist, Nos. 77 to 98, May 1870-December 1871; Nos. 164 to 170, January-July 1877; Nos. 184-199, September 1878-December 1879.
Field Naturalists' Quarterly, v. 1, 1900 (4 Nos.).
Hobbies, v. 4 to 15, 1897-1903 (Missing: Nos. 87 and 374).
Irish Naturalist, v. 3, Nos. 6-7-8-10-11-12, 1894.
Journal of Botany, No. 253, January 1884.
Journal of Conchology, v. 4, No. 10; v. 5, No. 11; v. 6, Nos. 1-3-8; v. 7, Nos. 3-8-9-10-11-12.
Journal of Malacology, September and December 1892.
Journal of Microscopy, v. 4 to 11, 1885-1892.
Knowledge, v. 20 to 26, 1897-1903 (Missing: Nos. 176 and 211).
Lincolnshire Notes and Queries, v. 5 to 7, 1896-1903 (Missing: v. 7, No. 59).
Natural History Review, v. 4, 1857 (bound).
Naturalist, v. 1, Nos. 3-4, May and June 1851; v. 2, Nos. 11 to 15, 17 to 19, 21-22, 1852; v. 4, Nos. 35 to 40, January-June 1854; v. 5, Nos. 50-56-57, April, October and November 1855; v. 6, Nos. 59 to 70, 1856; v. 10, No. 8 (4 copies), 1886; 1892.
Ornithologisches Jahrbuch, v. 8, Nos. 2-3, 1897.
Ornithologist, v. 1, No. 5, July 1896.
Practical Naturalist, 20 odd Nos., 1883.
Research, No. 15, September 1889.
Science Gossip, July 1874; 1885 to 1888 (Missing: January 1885, August 1886, February 1888); June 1894; November 1895.
Scientific Transactions of the Royal Dublin Society, v. 1, No. 10, February 1880; v. 3, No. 7, March 1885, No. 9, October 1885, No. 14, December 1887; v. 4, all parts except 5, 1888-1892; v. 5 to No. 1, v. 8 (all parts), 1893-1902 (unstamped).
Scientific Proceedings of the Royal Dublin Society, v. 4, Nos. 7-8-9, 1885; v. 5, Nos. 1-2, 1886; v. 6, pt. 3, to v. 9, August 1888-February 1903 (unstamped).
Wesley Naturalist, February, March, April 1888; March 1889.
Zoological Record, v. 1 to 4, 1864-1867 (bound).
Zoologist, December 1883, May 1884.

BOOKS.

- Barrett's (C. J.) Lepidoptera of the British Isles, 8 vols., 1893 (no plates).
British Association Handbooks to Leeds and Cardiff, 1890, 1891.
Carr's (J. W.) Geology and Natural History of Nottinghamshire, 1893.
Cole's (E. M.) Geology of the Hull and Barnsley Railway, 1896.
Edwards' (J.) Hemiptera-Homoptera of the British Isles, 1896 (no plates).
Elliot's (G. F. S.) Fauna Flora and Geology of the Clyde Area, 1901.
Ethnological Society's Transactions, v. 4, 1866.
Hett's (C. H.) Dictionary of Bird Notes, 1898.
—— Glossary of the Names of British Birds, 1902.
Jeffreys' (J. G.) British Conchology, v. 1, 1862.
Jones' (H.) Dogs I have known, 1893.
Knowledge Diary and Scientific Handbook, 1901, 1902.
Lees' (F. A.) Flora of West Yorkshire, 1888.
Lowerson's (H.) Sweet Briar Sprays, n.d.
Manson's (R. T.) Zig-Zag Rambles of a Naturalist, 1884 and 1898.
Marshall's Rural Economy of Yorkshire, 2 vols., 1788.
Murray's (A.) Catalogue of the Coleoptera of Scotland, 1853.
Porritt's (G. T.) Yorkshire Lepidoptera, 1883.
Roberts' (C.) Naturalists' Diary, n.d.
Stainton's (H. T.) British Butterflies and Moths, v. 1, 1857.
Tait (M.) Yorkshire: its Scenes, Lore, and Legends, 1888.
Tutt's (J. W.) British Noctuae, 4 vols., 1891.
United States Museum Proceedings, v. 2, 1879.
Watts' (W. M.) School Flora, 1878.
Who's Who, 1900.
Wingate's (W. J.) County Naturalists' Record Book, n.d.
Saunders' (E.) Hemiptera-Heteroptera, 1892 (no plates).
—— Hymenoptera Aculeata, 1896 (no plates).
Usher's (W. A.) Geology of N. Lincolnshire and S. Yorkshire, 1890.

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PUBLICATIONS RECEIVED.

Nautilus, July and August; Entomologist, Nature Notes, Nature Study, and Irish Naturalist, August; Annals of Scottish Natural History, Lincolnshire Notes and Queries, and Zoologist, July; Field Naturalists' Quarterly, June; Revue Bryologique, 1904, No. 4; Ann. Rep. and Trans. North Staffordshire Field Club, 1903-4; Ann. Rep. and Trans. Manchester Microscopical Society, 1903; Proceedings Berwickshire Naturalists' Club, 1901-2; Geelong Naturalist, June; Hull Museum Publications (No. 20), June; Naturæ Novitates, April-July; Le Mois Scientifique, July-August; Journal of Malacology, July; Ornithologisches Jahrbuch, July; La Feuille des Jeunes Naturalistes, August-September; Nature Study, July; Zoologist, August; Entomologist, September; Nature Notes, September; New Phytologist, June-July; Knowledge and Illus. Scientific News, August and September; Smithsonian Report Reprints: A Marine University, W. K. Gregory, The Morphological Method and Recent Progress in Zoology, and Nature Study, September.

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NOTES AND COMMENTS.

BOTANICAL SURVEY AT THE BRITISH ASSOCIATION.

At the recent meeting of the British Association at Cambridge, one of the mornings was occupied by papers on the ecology and distribution of native plants. Prof. A. G. Tansley (London), summarised recent progress, and gave the men of the north due credit for their work. Ecological work is now tending along two tracks—the general or botanical survey, and the more special. The former was ably dealt with in a paper by Dr. W. G. Smith. The method, which is now fairly well known to the Yorkshire Naturalists' Union, was compared with similar surveys now in progress in France and Germany, and the results already attained were briefly summarised and points for future consideration suggested. The kind of work included under the latter was exemplified by a paper by Mr. T. W. Woodhead on 'The Ecology of Woodland Plants.' Common plants like Bracken, Bilberry, Bluebell, *Holcus mollis*, *Aira flexuosa*, and others, were dealt with in regard to distribution in light and shade, and the correlated variations in external form and internal structure which accompany changed conditions.

Altogether the Y.N. Union had good reason to be satisfied with their contribution.

DEVELOPMENT OF A DIATOM.

'The Development of *Cocconema cistula* (Diatomaceæ)' is the title of a paper by Mr. C. Turner in the 'Annual Report and Transactions of the Manchester Microscopical Society for 1903.' In this the author expresses the opinion that *C. cistula* is reproduced from a minute spore by a process of growth which gives rise to one, two, three, or four diatoms. Mr. Turner's observations were made upon specimens collected in a drain in Willoughby Fields, near Alford. The paper is illustrated by a plate showing the development of the diatom from a spore. In the same report Mr. J. E. Lord contributes some notes, including the description of a new rotifer, *Diaschiza crassipes*, found near Rawtenstall.

BELEMNITE NOMENCLATURE.

In the August 'Geological Magazine' Mr. G. C. Crick has a paper bearing upon the question of the nomenclature of Belemnites. It appears that in 1823 J. S. Miller described certain forms to which he gave the name of *Actinocamax*—

a word which has been made good use of, particularly in recent years. Link, however, in his 'Beschreibung der Naturáliensammlung der Universität zu Rostock,' published in 1807, had already described this form as *Atractilites*. This name of course takes priority. It would be interesting to hear the remarks of recent writers on the chalk Belemnites in reference to this discovery. Will they revert to '*Atractilites*,' or wait to see whether a still earlier name is found for the same thing! No wonder some geologists sigh for the good old days when one spoke of Ammonites, Belemnites, Trilobites, Graptolites, etc., and did not split them into numerous sub-divisions as they are to-day.

RE-ESTABLISHMENT OF A DISCARDED BRITISH SLUG.

For many years *Limax tenellus* has occupied a precarious position in the list of British mollusca, and the recorded instances have all been open to more or less doubt for one reason or another, the earliest record being the most satisfactory, but never seen since its first appearance. This was in the Allansford Woods in county of Durham, in our own district. An excellent coloured drawing was made of it by Joshua Alder, which is a very faithful representation of the species, and is still extant, in the possession of the Rev. Canon Norman. The other records are all doubtful from the point of view of specific identification, none having been seen by a really competent limacologist, the counties for which they were made being Shetland, Ayr, Bute, and South-west York.

THE RE-DISCOVERY

has just been made in Scotland by the Rev. Robert Godfrey, of Edinburgh, who has been actively collecting slugs for Mr. W. Denison Roebuck, with the view of completing the survey of British and Irish Slugs for Mr. J. W. Taylor's Monograph.

It is gratifying to find that Mr. Godfrey not merely found the long-looked for *L. tenellus* but found that it was abundant, in fact the dominant species, in the pine-woods of the great Forest of Rothiemurchus, in Easternness Vice-county. The habitat is in the deeper recesses of the pine-woods, on the branches and stones which are imbedded in the accumulations of pine-needles and rotting vegetable matter. It is in these situations that it seems to be at home and to outnumber all the other species which occur with it. *Limax cinereo-niger* and *Arion subfuscus* and *A. minimus* are its companions.

THE TASK FOR NORTH-OF-ENGLAND CONCHOLOGISTS

is now to investigate the recesses of such extensive and ancient pine-woods as there may be in the Northern Counties of England, conchologists having hitherto with one accord passed such habitats by on the other side, so as to make for a district of limestone soil where shells abound.

In particular a close search ought to be made of the woods round Shotley Bridge, in the county of Durham, whence came the original record of 1853.

Let then our north-country sluggists set forth and search this autumn (for autumn is the real hey-day of *Limax tenellus*), and send the results, all the slugs that can be found in such spots, to Mr. W. Denison Roebuck or Mr. John W. Taylor, at Horsforth, for identification.

WHAT TO LOOK FOR.

This new old slug is unmistakable to those who know slugs in general, its black tentacles, its slender and graceful form, its delicate waxy-like yellowness, and moderate size distinguishing it from every other *Limax*.

Indeed, it is more likely to be passed over by the field observer for a species of quite another genus and family, not in the least allied, and in this category it stands with *Limax cinereo-niger*.

The latter in its completely black form looks in the field just like the big black slug (*Arion ater*), so common by pathways, to those who do not look carefully at the generic characters, such as the sculpture of the mantle and the position of the breathing-hole on the right side.

In like manner *L. tenellus* may be easily passed over for delicately-tinted specimens of *Arion subfuscus*.

HOW TO SEND SLUGS.

They should always be sent alive in tin boxes, which should be air-tight without boring holes in them. The reasons are three-fold; first, it saves the unnecessary trouble of boring holes; second, small ones squeeze out through the holes; and lastly, it is important that the evaporation of their own moisture be prevented. Finally, putrescible vegetable matters, such as cabbage or lettuce-leaves or fungi should never be put in, for they only decay and kill the animals. Damp moss is always safe, and failing that, grass.

POLLINATION OF THE PRIMROSE.

In an article entitled 'Further Observations on the Pollination of the Primrose and of the Cowslip' in the 'New Phytologist,' issued 27th July, Dr. F. E. Weiss gives the results of some interesting observations made by Miss Armitt at Rydal. It is recorded that in less than half an hour more than a dozen Primroses were visited by the Bee-fly (*Bombylius*). 'Following up one insect it was seen to visit two flowers on one root, both being thrum-eyed; then it went to another root and visited two flowers, which were pin-eyed. Another Bee-fly that was at work at the same time was also followed in its visits, first to a short-styled and then to a long-styled plant. On a subsequent day Miss Armitt was successful in detecting a Bee-fly visiting ten flowers in a quarter of an hour, one flower on one root, four on the next, three on another, and two on a fourth plant.' These observations go far to confirm those previously made by Dr. Weiss, and mark out *Bombylius* as the chief agent in the cross-pollination of the Primrose, and the result of the examination of the stigmas is clear evidence that these visits are not without effect.

 ARACHNIDÆ.

Chernes nodosus at Louth, Lincs.—On 7th September, through the kindness of Mr. J. Larder, I received a living specimen of this pseudo-scorpion which had been caught on the leg of a fly in Louth—in the warehouse in which a similar capture was made in September 1900, as recorded in 'The Naturalist,' 1901, p. 195. I take this opportunity of referring to my request for co-operation in a study of these curious Arachnids, made in a preliminary paper, 'North of England Pseudo-scorpions,' published in this journal in August 1903, and of saying that I shall be glad to examine and carefully return specimens which our readers may have the kindness to submit for this purpose. It occurs to me that microscopists who have formed general collections of objects are likely to possess specimens mounted in slides, and might not object to have them examined; such slides, I find, are often labelled '*Chelifer cancroides*,' which at one time was a sort of stock name for pseudo-scorpions of any kind. Figures of two of the British species and an indication of the places in which these creatures are found are given in the paper referred to.—H. WALLIS KEW, 9, Queen's Road, Bromley, Kent, 13th September 1904.

MOLLUSCAN FAUNA OF LANGSTROTHDALE.

W. DENISON ROEBUCK, F.L.S.

CONCHOLOGICALLY the results obtained during the Yorkshire Naturalists' excursion to Buckden for Langstrothdale were so satisfactory that, together with other material contributed by the Rev. Trevor Basil Woodd, B.A., they will be most usefully put into the form of a List of the Mollusca of Langstrothdale.

The district appointed for investigation was a very compact and well-defined one, consisting of the extreme upper part of Wharfedale from Starbotton northwards to the sources of the two becks, Oughtershaw and Greenfield Becks, which unite under the name of Wharfe at Beckermonds.

It is a mountain region, no part of it falling below 730 feet in elevation, and its mountain barriers on either side rising to a general level of about 1,800 feet, and culminating on one side at the fine summit of Buckden Pike (2,302 feet) and on the other at 2,001 feet on the Horse's Head.

Geologically it is entirely a limestone area, the fine scars of the Great Scar Limestone, and the fine woodlands which clothe the slopes, and the rich vegetation of the deep gills which cleave the mountain sides, combining to make the district a rich hunting-ground for conchologists.

The conchologists present throughout the whole three days of the excursion were Mr. John W. Taylor, Mr. T. Petch, B.Sc., and myself.

The first day's exploration was of the neighbourhood of Oughtershaw, and the roadsides on the way to it. The tarn on Oughtershaw Moor, 1,800 feet, and a pot-hole close to it, were examined but with negative result.

The second day was spent in the investigation of the slopes of the mountain, Buckden Pike, Mr. Taylor and I making the ascent from Starbotton, noting the mollusca and their altitudes as we ascended, while Mr. Petch, with his usual painstaking industry, searched Buckden Gill. All of us on our return searched the vicinity of Cray and the subsidiary Crook Gill.

The third day was devoted by all of us to the careful investigation of Buckden Wood and the gills which intersect it, an exceedingly rich hunting-ground which would repay further search.

Our material was added to partly by a small collection which I made in the wood last March, and by a number of shells

found in Raysgill in August 1890, by the Rev. Trevor Basil Woodd, B.A., to whom the Union was much indebted for various information.

The total number of species included in this list is 47, only seven of these being freshwater species, 10 slugs, and 30 land shells.

The most striking feature of the molluscan fauna of the dale, as shown by the present list, is its northern or subalpine facies, shown not only by the presence of northern types as *Clausilia cravenensis* and *Acanthinula lamellata*, which the close



Clausilia cravenensis: the Original Locality, Wall in Starbottan Village.

approach of the *Helix arbustorum* to the alpine form, known as the variety *alpestris*, still further emphasises; but the elevated and remote character of the district is further accentuated by the dwarfed growth of *Vitrea crystallina*, *Pupa cylindracea*, *Cochlicopa lubrica*, and other species which normally inhabit the milder climate of lower altitudes, and there attain a noticeably larger size.

About Buckden, in fact, we find a meeting-place or outpost of the retreating or subalpine fauna and the advancing and more dominant species, which latter, however, in their stunted

size or more limited numbers testify to the effects of the harder and more extreme conditions to which they are probably subjected in these upland regions.

The arrangement and nomenclature are according to Mr. Kew's 'Lincolnshire Non-Marine Mollusca,' published in the 'Naturalist,' August 1902, pp. 261-270.

CARYCHIUM MINIMUM Müll.

Buckden Gill, common; Buckden Wood, common on beech leaves.

ANCYLUS FLUVIATILIS Müll.

Raysgill, 4th August 1890, T. B. Woodd.

Not found in the beck *above* Buckden, T. P. Abundant on wet faces of rock beneath the waterfall in Buckden Wood, and also abundant in the Firth Gill stream above right up to the moor edge, about 1,000 feet alt.

LIMNÆA PALUSTRIS (Müll.).

Found in Beckermonds Tarn, 1904, by Miss E. G. Woodd.

LIMNÆA TRUNCATULA (Müll.).

Raysgill, 4th August 1890, T. B. Woodd.

Very common on wet moss in Buckden Gill and along the valley to Oughtershaw; common in water-trough at the inn, Buckden.

LIMNÆA PEREGER (Müll.).

Raysgill, August 1890, T. B. Woodd.

Horse trough at the inn, Buckden.

HELIX HORTENSIS Müll.

Raysgill, August 1890, T. B. Woodd.

Buckden Gill, Cray Gill, Oughtershaw (var. *lutea* 12345), Buckden Wood, not common.

HELICIGONA ARBUSTORUM (L.).

Common in Buckden Gill and Buckden Wood, T. P. The examples found in the latter place were small with elevated spire and approached the var. *alpestris*, J. W. T.

HYGROMIA RUFESCENS (Penn.).

Raysgill, August 1890, T. B. Woodd.

Abundant by roadsides and in the gills from Buckden to Oughtershaw, and at 850 feet on Buckden Pike.

Var. RUBENS. Also common.

HYGROMIA HISPIDA (L.).

Raysgill, August 1890, T. B. Woodd.

Common in the gills and by roadsides, etc., from Buckden to Oughtershaw, and to 850 feet on Buckden Pike.

Var. HISPIDOSA. As the type.

HYGROMIA GRANULATA (Ald.).

Near Hubberholme, one specimen by the roadside, T. P.

ACANTHINULA ACULEATA (Müll.).

One in Buckden Wood, W. D. R.

ACANTHINULA LAMELLATA (Jeff.).

Buckden Wood, a few on beech leaves, W. D. R.

BULIMINUS OBSCURUS (Müll.).

Buckden Gill, on grass, fairly common; Buckden Wood, a few; Crook Gill.

PUPA CYLINDRACEA (DaC.).

Raysgill, August 1890, T. B. Woodd.

Very common, Buckden Gill, Buckden Wood, and along the valley to Oughtershaw, T. P. Abundant at 1,000 feet altitude on the Starbotton slope of Buckden Pike, W. D. R. The examples found were mostly very small, J. W. T.

BALEA PERVERSA (L.).

Abundant on walls on east side of Cray Gill, T. P. On walls in Oughtershaw village, 1,250 feet altitude, J. W. T.

CLAUSILIA BIDENTATA (Ström).

Buckden Gill, Oughtershaw, Buckden Wood, not very common.

CLAUSILIA CRAVENENSIS Taylor.

Raysgill, August 1890, T. B. Woodd.

On walls throughout the district from Starbotton to Oughtershaw, abundant.

In this connection it is of interest to note that a wall in Starbotton village is the classic locality for this species, as it was here that I collected the type specimens from which Mr. Taylor described the species as new to science. The form, of course, was one well-known to collectors under the name of *Cl. dubia*, but as it was not the form described on the Continent under that name, and was specifically distinct from our other British *Clausiliæ*, it was necessary to describe it as new. It is a species which is, I believe, peculiar to the North of England.

CLAUSILIA LAMINATA (Mont.).

Crook Gill. Common in Buckden Wood.

COCHLICOPA LUBRICA (Müll.).

Raysgill, August 1890, T. B. Woodd.

Buckden Gill, Oughtershaw, Cray Gill, Buckden Wood, common.

Var. EXIGUA.

A few in Buckden Wood, J. W. T.

AZECA TRIDENS (Pult.)

Raysgill, 4th August 1890, T. B. Woodd.

Buckden Wood, common.

VITRINA PELLUCIDA (Müll.).

Raysgill, August 1890, T. B. Woodd.

Common in Buckden Gill and Buckden Wood, very small specimens.—T. P.

VITREA CELLARIA (Müll.).

Very common, Buckden Gill, Cray Gill, Hubberholme, Buckden Wood, Oughtershaw, etc., and noted up to 1,000 feet on the Starbotton slope of Buckden Pike.

VITREA HELVETICA Blum.

Raysgill, August 1890, T. B. Woodd.

Crook Gill, a few, J. W. T.

VITREA ALLIARIA (Mill.).

Very common, Oughtershaw, Hubberholme, Cray Gill, Crook Gill, Buckden Gill, Buckden Wood, and up to 850 feet on the Starbotton slope of Buckden Pike.

VITREA NITIDULA (Drap.).

Buckden Gill, one, T. P. Buckden Wood, in March 1904, several, W. D. R.

VITREA RADIATULA (Ald.).

One at 1,300 feet alt. near Oughtershaw Hall, W. D. R. Buckden Wood, J. W. T.

VITREA PURA (Ald.)

Buckden Gill, a few, T. P.

Buckden Wood, in March, 1904, W. D. R.

VITREA CRYSTALLINA (Müll.).

Raysgill, August 1890, T. B. Woodd.

Common, Buckden Wood, Buckden Gill, Cray Gill, Oughtershaw, etc.

Mostly referable to the small var. *contracta*.

EUCONULUS FULVUS (Müll.).

Raysgill, 4th August 1890, T. B. Woodd.

Fairly common, Buckden Wood, Buckden Gill, Cray Gill, Oughtershaw.

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LIMAX MAXIMUS L.

Very common in Buckden Wood, T. P. One found in Crook Gill was an exceedingly pale example of var. *fasciata*.

LIMAX CINEREO-NIGER Wolf.

One found in Buckden Wood, the very palest example I ever saw, and was referable to var. *intermedia* Brev., not before recorded for Britain.

LIMAX FLAVUS L.

Exceedingly abundant in the cellars of the Buck Inn. A lantern search yielded scores of examples of the var. *antiquorum*, with others approaching vars. *rufescens*, *flavescens*, *virescens*, etc. Their nocturnal rambles were extensive, as the south gable of the inn was literally covered with their slime-tracks from ground to roof.

LIMAX ARBORUM B.-Ch.

Oughtershaw, at 1,200 feet alt. Buckden Wood.

AGRIOLIMAX AGRESTIS (L.).

Abundant in both the usual forms, type and var. *reticulata*, throughout the district. Mr. Petch noted not seeing it near Oughtershaw Tarn, nor on the upper slopes of Buckden Pike, but I myself found the var. *albida* at 1,250 feet in Oughtershaw village, and the ordinary form commonly up to 850 feet on the Starbotton slope of the Pike.

ARION ATER (L.).

Common in Buckden Gill. Buckden Wood. On the hill-top west of Oughtershaw Hall, very common, including var. *aterrima*. Var. *plumbea* noted in Buckden Wood.

ARION SUBFUSCUS (Drap.).

Fields near Hubberholme. Crook Gill. Oughtershaw Hall, at 1,250 feet altitude.

ARION MINIMUS Simroth.

Crook Gill. Starbotton slope of Buckden Pike, at 850 feet alt.

ARION HORTENSIS Fér.

Common, Buckden village, Buckden Wood, Buckden Gill, Cray Gill, etc.

ARION CIRCUMSCRIPTUS Johnst.

Common, Buckden village, Buckden Wood, Hubberholme, Cray village, Oughtershaw village at 1,250 feet, and at 850 feet on the Starbotton slope of Buckden Pike.

PYRAMIDULA ROTUNDATA (Müll.).

Raysgill, August 1890, T. B. Woodd.

Common throughout the district examined in all the gills and plantations, and up to 850 feet on Buckden Pike.

Var. ALBA. One in Buckden Wood, T. P.

PYRAMIDULA RUPESTRIS (Drap.).

Raysgill, August 1890, T. B. Woodd.

On walls on the hill-sides, in unexpectedly small numbers. Buckden, Oughtershaw, Buckden Gill, Hubberholme, etc.

The specimens seen were small.

SPHYRADIUM EDENTULUM (Drap.).

Buckden Gill, two, T.P. Buckden Wood, J. W. T.

SUCCINEA PUTRIS (L.).

Sent by Rev. T. B. Woodd.

SUCCINEA ELEGANS Riss.

In wet places on the roadside near Deepdale, T. P.

SPHÆRIUM LACUSTRE (Müll.).

Raysgill, 4th August 1890, T. B. Woodd.

SPHÆRIUM CORNEUM (L.).

Raysgill, 4th August 1890, T. B. Woodd.

PISIDIUM PUSILLUM (Gmel.).

Dead shells in a ditch near Buckden village, T.P.

NESTING HABITS OF ROOKS.

J. A. WHELDON, F.L.S.

As the nesting habits of Rooks are under consideration in 'The Naturalist,' I looked up entries in my old notebooks regarding them. Under the date 16th February 1881 I found the following: 'Hooded Crows congregated in large flocks. Rooks building. Several rooks observed *pulling branches off trees* and carrying them to their nests; also taking up large tufts of moss and roots of stubble for the same purpose.' This note places the date of commencing to build two days earlier than the earliest noted by Mr. Gyngell, and singularly enough it was made at Scarborough, and probably in the same rookery, as I resided then on the South Cliff, at no great distance from the Valley Park, to which he refers.

On 15th April of the same year I examined a number of rooks' nests at North Otterington, near Northallerton. After several toilsome ascents of the lofty trees in which they were situated, they were all found to contain either young birds or eggs in an advanced stage of incubation.

A later note made in May states that 'the rooks frequently pull their nests to pieces before commencing to build in earnest, but afterwards the work proceeds very rapidly. The birds frequently pair on the nest. The nests are built of sticks and lined with *wool*, roots, hay, etc. When some nests contain almost fully-fledged young, others may be found containing new-laid eggs.' This latter entry would appear to bear out Mr. Gyngell's idea, that large rookeries consist of a congeries of smaller but independent colonies; or, an alternative supposition, it is possible that the housekeeping arrangements of some of the younger birds were delayed through persecution by their seniors.

'In 1881 the more forward of the young birds had left the nests in the second week of May.' 'The following year young rooks were noticed out of the nests on 8th May. It will be observed that wool is mentioned as one of the lining materials used by the North Otterington rooks. I have no reason to doubt the accuracy of this entry, although my memory will not carry far enough back to enable me to guarantee its absolute correctness. I can recollect one nest which had a good deal of string interwoven amongst the other material, and another which contained a portion of a pocket handkerchief. In the

same old notebook I find references to Jackdaws nesting in the trees at Otterington and at Castle Howard, and that their nests were usually lined with wool; if placed in a shallow hole in a trunk or branch no sticks were used as a foundation, but if the hole was a deep one enormous quantities were introduced to bring the level of the nest nearer the point of ingress.

YORKSHIRE NATURALISTS AT DENT.

THE 183rd meeting of the Yorkshire Naturalists' Union opened at Dent on Saturday, 3rd September, in delightful weather. The rain of the previous day, and the difficulty of reaching the place of meeting, undoubtedly affected the number of members present; still there was a good attendance. The party left the George and Dragon Inn in good time on Saturday morning for the investigation of Flintergill, Gawthrop, and the adjoining parts of Barbondale.

Unfortunately the various sections were not so well represented as they might have been—for some reason or other the officers of sections being conspicuous by their absence. The party was largely geological, and was under the able guidance of Mr. W. Robinson, the local secretary for the meeting. Mr. Handly took charge of the botanists, and the meeting had also the advantage of the local knowledge of Mr. J. Davidson, of Dent.

Mr. W. Robinson reports:—The geological party began work in Flintergill on the fossiliferous shales on the top of the Great Scar limestone and thence climbed up the Yoredale series, so far as the slippery rocks and storm water would allow, to the Moorland road at about 1,000 feet.

An extensive and charming panoramic view was here obtained of the most divergent mountain scenery. The rugged Lake District hills, with Scaw Fell and the Langdale Pikes standing out conspicuously in the clear atmosphere, presented in the west a marked and singular contrast to the smooth-surfaced dome-shaped Howgill Fells on the north, and the terraced, flat-topped, Millstone Grit-capped hills in the east. And there lay before us, in the immediate foreground, the pastoral, fairly-well wooded valley of Dent, with whitewashed houses of statesmen dotted here and there eloquently accentuating the peace and quiet of one of Nature's prettiest retreats.

From this vantage ground the tract of the Dent Fault could be traced from Barbondale for many miles right across the Dent and Garsdale Valleys, away past the 'Clouds' in Cautley, and onwards towards Kirkby Stephen in Westmorland.

Proceeding along the Moorland road to the north end of Barbondale, which seems to have been excavated on the line of



Photo by]

[R. Fowler Jones.

Memorial to Adam Sedgwick, Dent.

weakness due to the Fault which here runs through the centre of the valley, the party inspected the curious sequence of hog-backed ridges of limestone forming there the eastern margin of the Fault, and which, at one place, presented the curious feature that whilst one of these ridges appeared to dip rapidly to the west the next in line dipped as rapidly to the east—a result

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brought about by the unequal weathering of inverted rocks. A line of swallow holes running parallel to and on the west side of these ridges appeared to indicate the actual line of Fault here hidden by accumulated boulder clay.

The Fault itself was afterwards seen in a little waterless gill near Haycot Farm, the Silurian strata occupying one side of the gill, and the Carboniferous limestone the other. It was thence followed to the River Dee, and, on the next day, was pursued to the north side of the valley to near Helm Gill, where it was finally deserted in favour of fossil hunting in the Coniston limestones, and expeditions to the igneous dykes in the gill.

Helm Knot was afterwards climbed and many Graptolites were obtained in the grits on the summit. Mr. Sheppard was specially favoured in securing a fine *Orthocerus*, destined, we believe, to enrich the Hull Museum. From the Coniston Limestone also, Mr. E. Hawkesworth secured an exceptionally fine specimen belonging to the Cystid genus *Echinosphaera*. This genus is confined to Ordovician rocks, and examples of it are known in England, the Baltic countries, Belgium, and Bohemia. In its present condition the species, which has been examined by Dr. F. A. Bather, cannot be determined.

No particular note appears to have been taken of the vertebrates beyond the fact that the Kingfisher was particularly abundant, a large number being observed by different members of the party.

Mr. J. A. Hargreaves writes:—No systematic attempt was made to search for Mollusca, but advantage was taken of the intervals in the geological excursions, and of one or two walks in the district.

In addition to the list given on the excursion circular the following were noted:—

Hyalinia fulva.

Vertigo pygmæa.

Cochlicopa lubrica.

At the foot of the hill
coming from Dent Station.

Balea perversa. On roadside at
intervals for two or three
miles.

Helix arbustorum.

Hyalinia cellaria.

Azeca tridens.

Succinia putris.

All near Dent.

Arion ater. Several places.

Limnea truncatula var. *minor*.

Marsh at Dent Head.

Altogether he noted 21 species.

Mr. G. T. Porritt writes that the only Lepidopteron of note was *Oporabia filigrammaria*, which he found on the moors above Flintergill. The beautiful larvæ of *Hadena pisi*, found by various members, were plentiful. Neuroptera were scarce, and

only common species were noted ; whilst the entire absence of Trichoptera in so promising a district was quite extraordinary.

Mr. M. L. Thompson, F.E.S., reports that very few beetles were to be found, and those were of the more common species. The following were met with on the high ground above Flintergill :—

Carabus catenulatus Scop.

Notiophilus aquaticus L.

Harpalus latus L.

Pterostichus madidus F.

Pterostichus vitreus Dej.

Pterostichus nigrita F.

Calathus melanocephalus L.

Bembidium tibiale Duft.

Bembidium atroceruleum Steph.

Cercyon melanocephalus L.

Quedius fuliginosus Grav.

Coccinella 10-punctata L.

Brachypterus urticae F.

Meligethes æneus F.

Aphodius lapponum Gyll.

Aphodius depressus Kng.

Aphodius contaminatus Hubst.

Ceuthorrhynchus ericae Gyll.

BOTANY.—Mr. J. W. H. Johnson, B.Sc., writes :—September is more a month of fruits than one of flowers, and the botanists who visited Dent must have been struck by this paucity. Long ago the Hyacinth, Celandine, and Primrose of spring have disappeared, and are now almost forgotten ; the Rose of summer has already given place to the red fruits of autumn, and the flowers of the beautiful Campanula of last month have in turn ceded their position to fertile green capsules. In such a time of dearth the masses of golden yellow flowers of that ubiquitous Ragwort are, perhaps, more welcome than at any other period of the year. The miniature Eyebright now stands out among the shortened verdure with a particular beauty, despite the general lack of the brilliant flowers of summer. Even this season has its own and peculiar beauties. The grass-covered hills have now assumed a brown velvety hue, and here and there the purple patches of heather and wooded gills add a charm and beauty to the landscape which even that of summer cannot surpass. The bright green aftermath in the valley may still be seen tinged with the numerous flowers of the Meadow Cranesbill, while here and there the Great Burnet lifts aloft its purple heads in almost solitary grandeur. At higher elevations among the many-tinted Mosses, the beautiful white flowers of the Grass of Parnassus and the drooping scapes of the Sundew are still to be met with. Here, too, the downy heads of the Cotton Grass gently wave their silken threads in the moorland breezes ; and close by, in striking contrast, the rigid Bog Asphodel seems to have already assumed a defiant mien against the too rapidly approaching winter. Here may still be found the fertile cones of the lesser Club Moss, while on the drier patches among the

heather other Lycopodia rear their cones in the rays of the fast declining summer sun. The following list contains the more interesting plants met with :—

Ranunculus Lingua.
Ranunculus Flammula.
Ranunculus acris (double-flowered). Dent Station.

Cochlearia officinalis.
 Dale Beck, Ribbleshead.

Drosera rotundifolia.

Polygala depressa.

Sagina nodosa.

Geranium sylvaticum.

Geranium pratense.

Geranium sanguineum.

Near Ingleborough.

Ononis arvensis.

Ribbleshead.

Sanguisorba officinalis.

Rosa mollis.

Circea lutetiana.

Pimpinella saxifraga.

Scabiosa Columbaria.

Carduus heterophyllus.

Vaccinium oxycoccus.

Gentiana campestris.

Gentiana amarella.

Veronica scutellata.

Pinguicula vulgaris.

Primula farinosa.

Plantago media.

At Ribbleshead; not seen in Dent.

Empetrum nigrum.

Triglochin palustre.

Scirpus setaceus.

Cryptogramme crispa.

Polypodium dryopteris.

Polypodium phegopteris.

Lycopodium clavatum.

Lycopodium alpinum.

Lycopodium Selago.

Selaginella selaginoides.

To the above list Mr. J. Handley adds :—*Hieracium anglicum*, *H. rigidum* var. *tridentum*, *H. cæsium*, *H. boreale*, *H. umbellatum*, *Asplenium adiantum-nigrum*, and *Ceterach officinarum*.

No serious attempt was made to thoroughly investigate the mosses and hepatics in this wide area, but, from material collected on this hurried excursion, Mr. Ingham has kindly identified the specimens enumerated below. The lower part of the gill produced *Plagiochila asplenoides*, and var. *major*, *Porella platyphylla*, also *Jungermania Flærkii* and *J. ventricosa*. Large patches of *Hypnum palustre* and *H. commutatum* were common on the limestone rocks.

In the upper and better wooded portion of the gill *Jungermania barbata*, *J. incisa*, and *Metzgeria furcata* were met with; here *Pterygophyllum lucens*, *Breutelia arcuata* and fruited tufts of *Plagiothecium undulatum* were the most noteworthy mosses.

On emerging once more into the sunshine of the heather-clad slopes, *Hypnum Schreberi* and *H. cupressiforme* var. *ericetorum* were seen.

By the moist wayside leading to the fault some *Sphagna* and *Polytrichum commune*, *P. formosum*, *P. urnigerum*, and *P. piliferum* were found.

Near to the upturned masses of limestone—due to the great fault—is a swampy area which yielded *Jungermania ventricosa*, *J. cordifolia* and also *Hypnum revolens*, *H. scorpioides*, *Bryum alpinum* var. *viride*, *Campylopus atrovirens* and lower down a fruited patch of *Dicranella hetromalla* var. *sericea* was secured.

A further investigation of Cohn Scar disclosed the habitat of

<i>Rhabdoweisia denticulata.</i>	<i>Ptychomitrium polyphyllum.</i>
<i>Andræa petrophila.</i>	<i>Seligeria recurvata.</i>
<i>Bartramia pomiformis.</i>	<i>Rhacomitrium fasciculare.</i>
<i>Bartramia Cederi.</i>	

The following is a list of the more important ones met with :—

I.—HEPATICS.

<i>Diplophyllum albicans</i> (L.).	<i>Jungermania barbata</i> (Schreb.).
<i>Plagiochila asplenioides</i> (L.)	<i>Jungermania ventricosa</i> (Dicks.).
var. <i>major</i> .	<i>Jungermania cordifolia</i> (Hook.).
<i>Jungermania Flærkii</i>	<i>Metzgeria furcata</i> (L.).
(Web. & Mohr.).	<i>Porella platyphylla</i> (Moore).
<i>Jungermania incisa</i> (Schräd.).	

II.—SPHAGNA.

<i>Sphagnum acutifolium</i>	<i>Sphagnum subsecundum</i>
(Russ. & Warnst.)	var. <i>contortum</i> (Schp.).
vars. <i>flavo-rubellum</i> and <i>viride</i> .	<i>Sphagnum papillosum</i> (Lindb.).

III.—MOSESSES.

<i>Andræa petrophyla</i> Ehrh.	<i>Orthotrichum affine</i> Schräd.
<i>Polytrichum formosum</i> (Hedw.).	<i>Bartramia Cederi</i> Swartz.
<i>Polytrichum commune</i> (L.).	<i>Bartramia pomiformis</i> Hedw.
<i>Polytrichum urnigerum</i> (L.).	<i>Breutelia arcuata</i> Schp.
<i>Polytrichum piliferum</i> (Schreb.).	<i>Webera albicans</i> Schp.
<i>Ditrichum flexicaule</i> (Hampe.).	<i>Plagiobryum Zierii</i> Lindb.
<i>Seligeria recurvata</i> (B. & S.).	<i>Bryum alpinum</i>
<i>Rhabdoweisia denticulata</i> (B. & S.).	var. <i>viride</i> Husn.
<i>Dichodontium pellucidum</i> (Schp.).	<i>Fontinalis antipyretica</i> (L.).
<i>Dicranella heteromalla</i>	In Dale Beck, Ribbleshead.
var. <i>sericea</i> (Schp.) c.fr.	<i>Neckera complanata</i> Hubn.
<i>Blindia acuta</i> (B. & S.).	<i>Neckera crispa</i> var. <i>falcata</i> Boul.
<i>Campylopus atrovirens</i> (DeNot).	<i>Pterygophyllum lucens</i> Brid.
<i>Campylopus fragilis</i> (B. & S.).	<i>Anomodon viticulosus</i>
<i>Dicranum Bonjeani</i> (DeNot).	Hook & Tayl.
<i>Dicranum scoparium</i> (Hedw.).	<i>Climacium dendroides</i> W. & M.
<i>Dicranum majus</i> (Turn.).	<i>Camptothecium sericeum</i>
<i>Leucobryum glaucum</i> Schp.	Kindb. c.fr.
<i>Fissidens decipiens</i> DeNot.	<i>Plagiothecium undulatum</i>
<i>Grimmia apocarpa</i> Hedw.	B. & S. c.fr.
<i>Rhacomitrium fasciculare</i> Brid.	<i>Amblystegium serpens</i> B. & S.
<i>Rhacomitrium lanuginosum</i> Brid.	<i>Hypnum revolens</i> Swartz.
<i>Ptychomitrium polyphyllum</i> Furnr.	<i>Hypnum falcatum</i> Brid.
<i>Tortula aloides</i> DeNot.	<i>Hypnum cupressiforme</i>
<i>Barbula cylindrica</i> Schp.	var. <i>resupinatum</i> Schp.
<i>Barbula rigidula</i> Mitt.	var. <i>ericitorum</i> B. & S. (slender form).
<i>Weisia rupestris</i> C.M.	var. <i>tectorum</i> Brid.
<i>Zygodon Mougeotii</i> B. & S.	<i>Hypnum scorpioides</i> L.
<i>Ulota Bruchii</i> Hornsch.	
<i>Orthotrichum capulatum</i> Hoffm.	

A few fungi were collected by Mr. Johnson, and submitted to Mr. Crossland, who identified them as *Clavaria fusiformis*, *C. vermicularis*, *Puccinia poarum* (on Coltsfoot) and a *Crepidotus* (sterile).

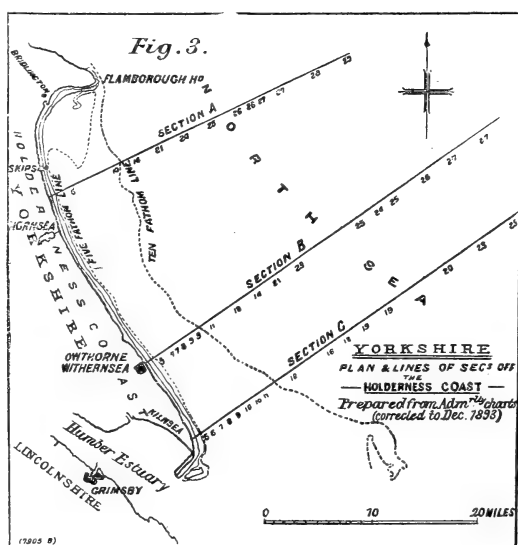
The usual business meeting was held, after which Mr. Robinson gave a charming description of the geological history of the district.

T. S.

Naturalist.

cliffs; here we observe the advance of deep water; and since it is improbable that the general inclinations of the shore and sea bottom have very materially altered since the old days, we may fairly suppose that when those ancient towns existed the five-fathom line was a mile or so out to sea, that is, two miles out from the present coast line (Fig. 1).

'The erosion below low-water level, whilst it deepens the sea bottom, adds to the height of the shore above low-water mark, and this change of position of material, of course, increases the steepness of the shore, and therefore brings deep water closer inland (Fig. 2).



'I am inclined to believe that, in all situations where the sea's encroachment is steady and continuous, and the material is of a soft and easily eroded nature for a considerable depth below low-water level, no protective works erected on the visible shore between high and low water levels can be expected to permanently arrest the encroachment of the sea, though they may afford temporary relief by collecting and retaining material for short periods.

'Sections taken in a north-easterly direction into the North Sea seem to indicate that the five-fathom line is reached about a mile from the shore, and that the ten-fathom line is found at

about six or seven miles distance—a marked flattening of the gradient of the sea bottom occurring at the seventeenth or eighteenth mile, and in about twenty fathoms (Figs. 3 and 4).

Is it not possible that the chalk may have been reached in this 120 ft., and that the erosion is going on steadily in the softer material of the strata above?’

In all cases, where the material is of a soft and easily eroded nature for a considerable depth below low water level, we have to consider the following :—

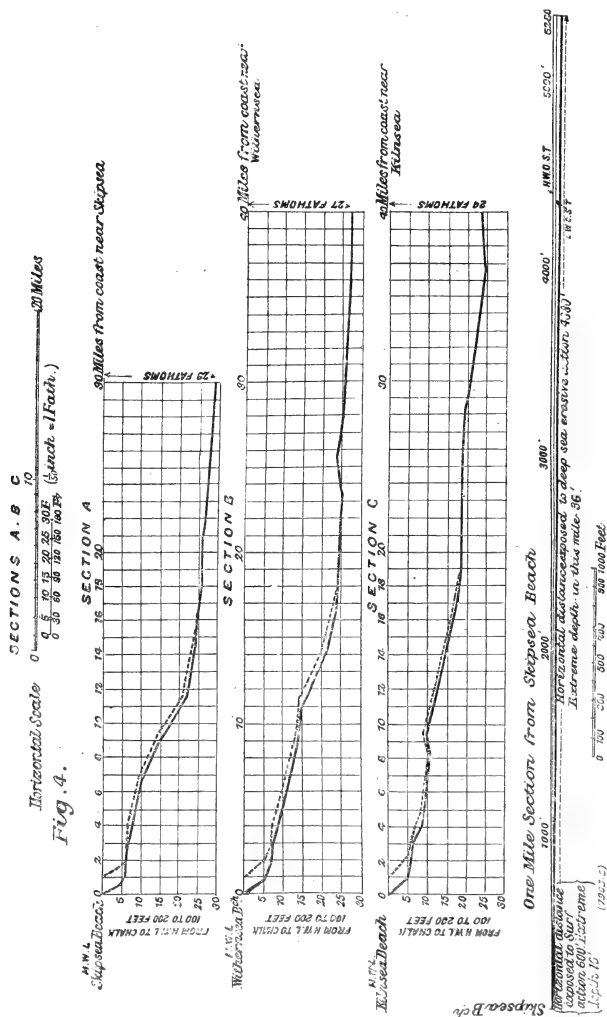
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|----------------------|---|--|
| CHIEF CAUSES. | { | (1) Surf and wave action on visible shore between high and low water. |
| | | (2) The erosion going on below low water level many miles out to sea and in 5 to 10 fathoms. |
| CONTRIBUTORY CAUSES. | { | (3) The action of countless borers, worms, eels, shell-fish, etc., etc. |
| | | (4) The action of submarine springs. |

It has been so long customary to speak of ‘beach,’ ‘shore,’ or ‘foreshore,’ as quite distinct from ‘sea-bed’ or ‘sea-bottom,’ that we may get into the habit of regarding them as not being continuations of the same surface. One has, for example, been in the habit of regarding the shore as a natural bank with a very flat gradient, the toe of which extends to low water mark. It would be more correct to look upon the junction of the glacial drift or other erodible material with the chalk, rock, or other hard material as the toe of the bank under consideration. Off the Holderness coast this toe is to be found in many fathoms of water and miles out to sea.

We should arrive at a clearer view if we would regard the sea as water held in a great basin which, in consequence of the tides, seems to us to be more full at certain times than it is at others. The visible shore—i.e., the portion exposed between the tides—is the rim of the basin, but none the less part of the same vessel.

It will, therefore, appear more correct to regard as ‘sea-bed’ all surfaces actually beneath the sea at highest spring tides. If this view be accepted we can more readily eliminate from our minds the popular fallacy that all our troubles begin and end in the changes we observe on the little strip of visible shore between high and low water marks.

The utility of a wall or embankment is dependent on the stability of its foundations, and exactly the same may be said of a shore. You may put as many walls, embankments, and groynes as you please on a shore, and they may be all of the



most skilful design and best construction, but unless you can prevent the erosion *below* low water level they must all go. They can at best be only regarded as palliative measures.

We are indebted to the proprietors of 'Engineering' for the use of the accompanying illustrations.

MOSSES AND HEPATICS OF THE BUCKDEN DISTRICT.*

WILLIAM INGHAM, B.A.

THE most striking moss of the Buckden district is *Camptothecium sericeum*, which, with its large silky masses, covers the walls and rocks almost everywhere. Next in abundance to this is the pretty *Hypnum molluscum*, also in large tufts. Another moss frequently met with on the dry walls and rocks is the curly-leaved *Trichostomum tortuosum*, which occurs in large rounded tufts.

Of the uncommon mosses, the large silky tufts of *Orthothecium intricatum* occur frequently on rocks in the wood opposite Buckden, and on rocks by the gills. *Trichostomum mutabile* var. *cophocarpum*, a beautiful moss, yellow above and red below, and with its leaves neatly curled in the dry state, although rare, is quite a marked feature of the moss-flora of this district. It is a true xerophile, and prefers the shady recesses of limestone rocks. It grows by the side of Buckden Beck, in Deepdale, in Kirk Gill, and in the wood on Birk's Fell. I traced it to Grassington, where it grows in the crevices of the steep limestone cliffs by the side of Grass Wood, and it extends down the Wharfe as far as the Strid, where I first found it on 16th August 1900. It also occurs at Ingleton. Another uncommon moss, *Barbula recurvifolia*, also a xerophile, is frequent on the rocks by the road to Oughtershaw, both the ordinary state and a very tall slender form. It is also at home on the dry limestone of Arncliffe Cloulder, and on similar rocks by Grass Wood, Grassington.

The *Sphagna*, or peat mosses, are poorly represented, and three species only were seen, which will be noted later.

A striking feature of the Hepatics or Liverworts is the frequent occurrence of *Scapania aspera*, not hitherto, I believe, recorded from the West Riding. It is a typical xerophile, choosing the driest of rocks for its habitat, but always limestone rocks. No doubt this hepatic, until distinguished on the Continent, was often confounded with *S. nemorosa* or *S. resupinata*. A good mark of distinction for *S. aspera* I find to be the 7 to 8 opaline papillæ or warts on the face of each leaf-cell. *S. aspera* is especially abundant on the dry rocks by the roadside on the way to Oughtershaw. It also occurs on the dry rocks by Buckden Gill, in the wood on Birk's Fell and in Cray Gill.

* Meeting of the Yorkshire Naturalists' Union, 30th July to 4th August 1904.
1904 October 1.

I propose now to deal with the uncommon mosses, or those of interest, noted in the different routes taken.

I.—BUCKDEN BECK AND PIKE AND CRAY GILL.

By the beck the rarest is *Ditrichum tortile*, known only from Yorkshire, Sussex, and Kent, and new to the West Riding. A very pretty pale green *Scapania æquiloba*, with strongly verrucose cuticle, occurs here. Near a waterfall was a very large mass of *Mnium affine* var. *elatum*.

Near the top of the Pike, and close by a beautiful mass of *Ranunculus Lenormandi*, grows a richly-coloured moss, the var. *purpurascens* of *Hypnum exannulatum*, which I find is very rare and grows only at high levels. Here also is the rarest *Sphagnum* we saw, viz., the var. *spectabile* of *S. squarrosum*.

On the top of the Pike, but on the North Riding side, occurs a large *Kantia* unlike any *Kantia* we have. A Swedish specialist on this genus, Mr. Macvicar, and myself agree that it deserves more study before it can be correctly named. The same *Kantia*, also, in large, pure masses, occurs at the top of Deepdale, in the West Riding. I hope to report upon this hepatic later in the year. Near the *Kantia*, and in a similar habitat, Mr. Johnson found *Splachnum sphaericum*. He also found the same moss in fine fruit on the moor above the source of Deepdale Gill.

In Cray Gill is quite a number of interesting mosses and hepatics. Perhaps the rarest is the minute *Seligeria tristicha*, accompanied by the minute hepatic *Lejeunea calcarea*. A very slender form (of most vivid green colour) of *Weisia curvirostris* occurs in large tufts near a waterfall. In the bed of the gill is a large tuft of the true var. *pumila* of *Philonotis fontana*. On the vertical face of a large stone is *Eurhynchium Teesdalei* in fruit.

Other mosses of Buckden Beck, Pike, and Cray Gill are:—*Barbula rigidula* Mitt., c.fr., *B. spadicea* Mitt., c.fr., *Campylopus flexuosus* Brid., *Mnium rostratum* Schrad., *Dichodontium pellucidum* Schp., c.fr., *Trichostomum mutabile* var. *cophocarpum* Schp., *Orthothecium intricatum* B.&S., *Plagiothecium pulchellum* B.&S., c.fr., *Webera cruda* Schwgr.

The hepatics noted are *Jungermania riparia* Tayl., *J. Flærkii* Web et Mohr., *J. turbinata* Raddi, *Scapania aspera* Müll et Bern., *Chiloscyphus polyanthos* (L.), *Blepharozia ciliaris* (L.), and *Preissia commutata*, crowded with fruit.

Another peat moss, *Sphagnum recurvum*, occurs on the top of the Pike, as also *S. acutifolium* var. *viride*, both on the Pike and on Birk's Fell.

II.—BUCKDEN TO OUGHTERSHAW.

By the roadside, among grass, was a large mass of *Hypnum stellatum* forma *gracilis* Boulay. On the dry limestone *Trichostomum crispulum* and the brown tufts of *Barbula recurvifolia* were frequent. Other mosses were *Dichodontium pellucidum* forma, *Orthotrichum anomalum* var. *saxatile*, *O. cupulatum*, *Barbula rubella*, *Weisia rupestris* var. *compacta*, and *Barbula spadicea*.

The hepatics were *Scapania aspera*, the dominant one in dry places, *Jungermania cordifolia*, *Plagiochila Dillenii*, and *Cephalozia fluitans*.

III.—BIRK'S FELL AND WOOD.

In the wood large masses of *Bartramia Cederi* covered with capsules were prominent. *Webera cruda*, in fruit, and the hepatic *Jungermania Lyoni*, in fruit, grew intermixed. The pale, dull green, flat patches of the hepatic *Metzgeria pubescens* grow here in shade.

In Step Gill, up the fell, is *Amblystegium filicinum* var. *Vallis-clausæ*, and on dry stone *Weisia viridula* var. *densifolia*, but the rarest moss of this gill is *Philonotis adpressa*, which I think is an addition to the Yorkshire flora. This moss I recorded from Burnhope Burn in Durham. The source of Step Gill is filled with *Brachythecium rivulare* var. *cataractarum*, with *Nardia compressa* and *Chiloscyphus polyanthos*, two large hepatics.

Dichodontium flavescens, with very pellucid cells, and a curious form of *D. pellucidum* also grow by the gill.

IV.—DEEPDALE.

The interesting mosses of this dale are *Weisia curvirostris* var. *scabra*, *Dicranum Bonjeani* var. *juniperifolium*, *Trichostomum crispulum* var. *nigro-viride*, and a flat prostrate form of *Plagiothecium pulchellum*.

The hepatics, too, are interesting, the chief being *Lejeunea serpyllifolia* var. *heterophylla*, *Lophozia Muelleri*, a large form near var. *subcompressa* (Limpr.), and a smaller form with the mature leaves like *L. bantriensis*, *Nardia compressa*, *Jungermania ventricosa*, *Scapania purpurea*, and on a ledge of rock on the return by Cray Gill, a very fine growth of *Reboulia hemisphærica* covered with capsules.

The *Reboulia* also grows on the very dry limestone rocks of Arncliffe Clouder.

On the moor over Deepdale occurs the interesting large *Kantia* above alluded to and *Splachnum sphaericum*.

V.—KIRK GILL.

A prominent feature here is the large masses of *Plagiothecium undulatum* covered with fruit, also *Eurhynchium crassinervium*, not noted in the other gills. *Zygodon viridissimus* and *Ulota Bruchii* are fine here.

Of hepatics, may be noted *Lophozia Lyoni*, the male plant, the antheridia in the axils of the leaves giving a curious catenulate appearance to the branches. I have not noted elsewhere such large pure tufts of *Blepharostoma trichophylla* with perianths as in this gill. We advanced but a short distance up Kirk Gill, when we were stopped by a violent thunderstorm, which made us beat a hasty retreat. The character of this gill by the side of a dense fir wood is such as to produce a rich moss and hepatic flora to anyone who can trace it to its source.

On a damp wall near the church at Hubberholme grows the true *Brachythecium salebrosum*, a rare plant. Mr. Dixon also says of it, 'certainly the true one.'

B. glareosum, which is sometimes taken for *B. salebrosum*, grows in the wood opposite Buckden.

It will be seen by the above that Buckden is an excellent centre for the bryologist. The gills are all interesting, and both mosses and hepatics are luxuriant, the latter quite as much so as the former. The comparative scarcity of the peat mosses in this district, as judged by the routes traversed, is worthy of notice. Even in the places where they were met with, they were of short growth, and formed only a thin covering on the peat.

MOSSES.

Lincolnshire Mosses.—Several mosses were taken at the meeting of the Lincolnshire Naturalists' Union at Barton-on-Humber, on the 20th May. *Seligeria paucifolia* Carr, a rare moss and a first record for the county, was found growing on a block of Middle Chalk in South Ferriby Quarry. In this same quarry three mosses new to Div. 3 were also taken: *Webera carnea* Schp., *W. albicans* Schp., and *Zygodon viridissimus* R.Br. This last had clavate-jointed gemmæ on the leaves and radicles, a rare occurrence in the county.—S. C. Stow, Grantham, 13th July 1904.

THE RED ROCKS UNDERLYING LINCOLNSHIRE.

HENRY PRESTON, F.G.S.,

Grantham.

AN examination of a geological map of Lincolnshire reveals the fact that the oldest rock masses coming up to the surface lie on the western edge of the county. There are some comparatively small patches of red Triassic strata on the east side of the Trent valley just around Gainsborough and northwards to Epworth and Crowle.

The presence of these rocks in Lincolnshire is not only attested by the outcrop of the red beds, but several interesting borings have been made which prove their existence underground, and in some cases have also given their thicknesses. As to their probable extension under the whole county, it should be noted that in Nottinghamshire similar strata crop out right along the county, and often only a few miles away from the Lincolnshire border. These rocks then dip eastwards under Lincolnshire and become buried beneath newer strata. The most easterly point at which they have been proved is at the boring now being put down at the Lincoln Waterworks, and there is every probability that they extend over the whole county, and hence may be looked upon as the Great Foundation Stones of Lincolnshire.

The Bunter rocks consist of an upper and lower bed of bright red sandstone, with an intermediate bed of darker coloured sandstone and pebbles. These beds cover some thousands of square miles of surface, and undoubtedly form one of the most important water-bearing formations in the country. The water, too, is generally of excellent quality. The Rivers Pollution Commissioners describe the new Red Sandstone rock as the most effective filtering medium known, every trace of organic matter being converted into innocuous mineral compounds.

With regard to the Lincoln boring, the clays and limestones of the Lower Lias have already been passed through, and at the bottom of these were found the Rhætic shales. Beneath these black Rhætic shales are red marls with bands of gypsum. The boring has now penetrated these red marls to a depth of 200 feet, and possibly a further 600 feet will be encountered before their lower beds are reached. After the marls will come beds of sandstone interspersed with numerous seams of compact marl and some sands and pebble beds. Where these beds crop out at the surface they throw out springs to such an extent that

they are known as 'Waterstones.' The water, however, from these beds is often very variable in quality from bed to bed when tapped by deep borings, and is much more liable to be heavily charged with mineral salts than that from the Bunter beds below.

The group called the "Waterstones" form the basement beds to the marls, and the whole of the strata from these beds up to the Lias are together known as the Keuper formation. Below the Keuper are the thick beds of red sandstones and pebble beds. These are the Bunter beds, and in them it is expected to find water. Thus, then, the boring when it is completed will have passed through four distinct sheets of rock—the Lower Lias, the Rhætic Beds, the Keuper Marls, and the Bunter Beds, given in descending order.

As already stated, several borings have proved the presence of Triassic beds in Lincolnshire. The boring at Lincoln reached the Keuper marls at a depth of 699 feet from the surface. This gives a definite point for comparison with other sections where the junction between Keuper and Rhætic is known. At Grantham a boring was put down at Messrs. Hornsby's works in 1875. The depth reached was 853 feet, the boring rods passing through the Rhætic beds and just touching the Keuper marls. At Gainsborough each of the two borings started in Keuper marls, and a depth of 1,515 feet was reached without passing through the Bunter. The South Carr boring, made in search of coal, is at one of the most westerly points of the county border, about seven miles to the north-west of Gainsborough. Commencing in Keuper marls, it passed through 1,151 feet of Triassic beds, and ultimately reached a depth of nearly 3,200 feet. This boring is particularly interesting as being the only place in Lincolnshire where the coal measures have been proved. The only other boring in Lincolnshire of any importance relating to the Trias is the one at Scunthorpe. There a very small section of Rhætics (about a foot) was met with below the alluvium and drift sand, and altogether a depth of 1,767½ feet was reached without getting to the base of the Bunter. Besides these, there are deep borings at Melton Mowbray, Owthorpe, Newark, South Scarle, Retford, and Hatfield, all of which throw interesting light on the Lincolnshire Trias.

The Lincoln boring has already developed thicker beds of Liassic strata than were expected, and the fact that the Keuper beds were met with at 679 feet below Ordnance datum is very interesting when compared with Melton Mowbray and

Scunthorpe. Meltón Mowbray lies south, 7 degrees west, of Scunthorpe, at a distance of $57\frac{1}{4}$ miles, and the Keuper marls are struck at practically the same level, viz., 25 O.D. The position of the Lincoln boring is $9\frac{3}{8}$ miles east of this line of strike, thus giving the dip of the Keuper beds as 70 feet per mile east, 7 degrees south.

FIELD NOTES.

MAMMALS.

Pollard Willow Fauna.—In Mr. Peacock's fauna of the Pollard Willow (Nat., 1903, p. 182) I do not find any mention of the Long-eared Bat (*P. auritus*). This species used to be very frequent in old willow trees on the banks of the rivers Wiske and Swale, and in my bird-nesting days I have often found more than one suspended in hollow trunks, or even crouching in holes formed by the decay of a branch. The Common Bat used to fly over these rivers also, but I presume it rested under the bridges, as we never found it in the trees with the Long-eared Bat.—J. A. WHELDON.

COLEOPTERA.

***Prionus coriarius* L. in Cheshire.**—This fine Longicorn is rare in Cheshire. In Dunham Park (a locality cited by Canon Fowler, 'The Coleoptera of the British Islands,' Vol. IV., p. 219) I took an example more than twenty years ago, and on 28th July this year I picked up a female which was struggling on its back in a lane near Chelford.—CHAS. OLDHAM, Knutsford, 25th August 1904.

***Cymindis vaporariorum* on Bardon Moor.**—The range of this species is evidently more extensive than we have supposed. During Whit-week (1904) I found it, not uncommonly, on Bardon Moor, in Wharfedale, whilst a week later my friend, Mr. Walter Mann, in my presence found one specimen on Rombalds Moor, where I have in years gone by spent many a half-day in searching for it.—J. W. CARTER, Bradford.

***Blethisa multipunctata* near Carlisle.**—I took a specimen of *Blethisa multipunctata* L. about seven miles from Carlisle on the banks of the river Irthing on 7th May 1901. I have not had the opportunity to search for it again. The only previous records are in Stephen's 'Illustrations,' Vol. V., p. 390,

'Sometimes occurs abundantly near Carlisle,' by the late T. C. Heysham; Stephen's 'Manual,' p. 61; Curtis' 'British Entomology'; Dawson's 'Col. Britannica,' p. 53.—GEORGE B. ROUTLEDGE, F.E.S., Carlisle, 5th September 1904.

***Lampyris noctiluca* L. in Cheshire.**—The Glow-worm is only a local insect in this county. Old Knutsford residents tell me that in the middle of the last century it occurred in a damp place by the side of the road which skirts Tabley Park, but it is not there now. In the summer of 1903 it was very plentiful in one part of Knutsford Moor, and I found it more sparingly on the railway embankment near Bramhall Station. This year it is reported from Marple, an old locality (c.f. Melvill, 'British Association Handbook,' 1887). On 14th July I collected a number of the beetles—larvæ and mature males and females—on Knutsford Moor. In one case four males were competing for the favours of one brilliantly-glowing female, crawling over her body. On reaching home I put the insects—forty or fifty in all—on a tray, and again noticed the competition among the males. In several instances three or four males swarmed over the body of a female, even after one of their number had copulated.—CHAS. OLDHAM, Knutsford, 25th August 1904.

***Geotrupes typhæus* in the Lake District.**—It is interesting to find from Mr. Oldham's note ('The Naturalist,' September, p. 284) that *Geotrupes typhæus* is present on the south-western side of our mountains, as well as in the centre. Here in Rydal it bores in a layer of stiff yellow soil, intermixed with stones, that thinly covers the slate rock of Loughrigg on its lower slopes, a little above the lake—a deposit possibly of the glacial period. The little yellow heaps are so conspicuous in mid-winter time on the green of the fell-grass and moss, that it is impossible not to speculate on the life-history of the little creature within the burrow, that can heave and turn out stones larger than itself. In January and February the heaps are abundant; my calendar even shows the 21st November as a date when I once found three of them. But the inhabitant is not easily seen. The tunnel is some inches in depth, and deflected, no doubt to keep the rain out. I once dug the beetle out—a perfect, horned male—on 6th March, and I have met with it walking laboriously abroad, as early as 17th February. But from the fewness of our encounters, I have wondered if its habits were nocturnal, in which case the presence of the Nightjar on this fell-side would be accounted for.—MARY L. ARMITT.

LEPIDOPTERA.

***Cemiostoma laburnella*.**—I have noticed this pretty little micro in the garden here regularly twice a year for over twenty years, but never in anything like the abundance of the last day or two. The least tap of a laburnum branch or shrub adjoining dislodged them by the hundred.—A. E. HALL, Sheffield, 17th August 1904.

GEOLOGY.

Walrus Remains in Holderness.—Amongst a collection of bones recently received at Hull from the excavations now being made at Kelsey Hill by the North Eastern Railway Company, is a tusk 9 inches in length and $1\frac{3}{4}$ inches in width. This proves to be the tusk of a Walrus (*Trichechus rosmarus*). With it were bones of *Bos primigenius* and Red Deer. Strangely enough the finest collection of Walrus bones previously obtained in Britain came from excavations made in an adjoining hill by the Hull and Barnsley Railway Company many years ago. These are described in Clement Reid's 'Geology of Holderness,' and some time ago, when endeavouring to trace the Walrus bones, I communicated with Mr. Clement Reid, who wrote as follows: 'From Messrs. Lucas & Aird I borrowed two boxes of bones, obtained whilst ballast was being dug for the new docks. These were nearly all unworn, though broken, vertebræ of Bison, mixed with a few perfect bones of Walrus. All the fragments of bones of Elephant or Rhinoceros were, as far as I could remember, worn. The important point seems to me that, though many of the bones are worn, yet there is a considerable admixture of the spongy vertebræ of Bison. The Walrus bones also were quite perfect. The saddest thing remains to be told. When I borrowed the specimens I did not at all like having to return the finest set of Walrus bones yet found in Britain. In 1896 or 1897, however, I spoke to Sir A. Geikie about them, fearing that they might be lost to science, as there was a Mouse's nest in one of the boxes when it came. He wrote to Sir John Aird, but unfortunately it was too late, the boxes having already been thrown away as useless.' Eventually the Walrus bones referred to were found in a cellar under the Hull Museum, and the remains, together with the tusk recently discovered, now occupy a position in the Geological Gallery there.—T. S.

REVIEWS AND BOOK NOTICES.

Students' Handbook of British Mosses. By **H. N. Dixon, M.A., F.L.S.** With Illustrations and Keys to the Genera and Species by **H. G. Jameson, M.A.** Second edition revised and enlarged; pp. xlix. + 586 and 65 plates. Eastbourne: V. T. Sumfield. 18s. 6d. net.

The appearance of a second edition of this invaluable handbook testifies to its popularity. Since the first edition was published in 1896 thirty species or sub-species have been detected, together with numerous varieties; these have been included and are illustrated by five new plates. Two of the new species figured are *Tortula cernua* Lindb., found by Mr. G. Webster at Aberford, and *Tetraplodon Wormskjoldii* Lindb. from Widdy Bank Fell. Among the new varieties are several from Yorkshire and Lancashire, discovered by Messrs. Ingham and Wheldon. Numerous changes have been made and some genera have undergone considerable revision, viz.:—Sphagnum, the Systegium section of Weisia, Pottia, and the Harpidioid Hypna; in the latter Mr. Wheldon's paper in 'The Naturalist' (1902, p. 65), receives due acknowledgment. Other alterations found in this edition, and which students will fully appreciate, are the insertion of the derivations of the generic names, and in the index the pronunciation of both generic and specific names is indicated. The index is further improved by the addition of the page number to each genus. In all the text of this edition is increased by 60 pages. The work is indispensable to and ought to be in the hands of all students of British mosses.

◆◆◆

Manual of British Botany. By the late **C. C. Babington, M.A., F.R.S., &c.** Ninth edition. Edited by **H. and J. Groves.** Pages lii. + 580. London: Gurney & Jackson. 9s. net.

A special interest attaches to this edition, the primary object of its issue being to publish the notes in the late Prof. Babington's interleaved copy of a former edition. Owing to Mrs. Babington's particular wish that the text as amended by the late author should not be interfered with the editors have not been able to make alterations in the treatment of some of the critical genera which might have been desirable. Still many important additions have been made. An entirely new account of the genus *Hieracium* has been drawn up by Miss R. F. Thompson under the direction of Mr. F. J. Hanbury. In the genus *Rubus* we have in addition to Prof. Babington's account, an appendix containing a conspectus of the groups and species from the Rev. W. Moyle Rogers' 'Handbook of British Rubi,' while the aid of Messrs. Fryer and Townsend has been secured with *Potamogeton* and *Euphrasia*. In following the law of priority, many changes in nomenclature appear, some very unfamiliar; let us hope it is a step near finality. In the synopses of Natural Orders and also of the genera at the head of each order it would have greatly facilitated reference if the page number had been given. Great care has been taken by the editors, with the assistance of many specialists, to bring this edition up to date, and it will be welcomed by all field botanists.

Eton Nature Study. Part II. By **M. D. Hill** and **W. M. Webb.** Duckworth & Co. 3s. 6d. net.

In May last we referred to the excellence of Part I. of 'Eton Nature Study.' Part II. has now appeared and is in every way equal to its predecessor. The present volume contains 174 pages of instructive letterpress and no fewer than 120 illustrations—largely from photographs. It also deals with topics as varied as those in the first volume. As an



Wild Hyacinths.

example of the up-to-date character of the work, reference might be made to Chapter 34, dealing with 'Plant Associations.' In this every acknowledgment is made to the pioneer work of the late Robert Smith, now so excellently followed up by his brother, Dr. W. G. Smith, of the Leeds University. From this chapter we select a block as a specimen illustration, by the permission of the publishers.

Messrs. Mote & Sons have issued a 'Pictorial and Descriptive Souvenir of Saltburn-by-the-Sea and Redcar,' the letterpress of which has been supplied by the Rev. W. C. Hey, M.A., of West Ayton.

NORTHERN NEWS.

Dr. F. Cavers has a paper 'On the Structure and Development of *Monoclea Forsteri*' in 'Revue Bryologique,' 1904, No. 4.

Mr. W. Ackroyd (Halifax) contributes a paper to the 'Transactions of the Chemical Society,' July 1904, entitled, 'The Action of Radium Rays on the Halides of the Alkali Metals and Analogous Heat Effects.'

The first volume of 'A Monograph of the British Desmidiaceæ,' by W. West, F.L.S., and G. S. West, M.A., F.L.S., has just been issued by the Ray Society. It is illustrated by 32 plates, mostly coloured.

In the recently-issued 'Transactions of the Norfolk and Norwich Naturalists' Society' (Vol. 7, Part 5) Mr. Arthur Bennett has a paper on 'The Distribution of *Carex paradoxa* and *Lastrea cristata* in Britain.

On the excursion of the Yorkshire Naturalists' Union to Hebden Bridge in June, Mr. W. E. L. Wattam found a lichen (*Parmelia pinniformis*) new to the district. Strangely enough the record first appears in another periodical.

'A List of West Lancashire Lichens,' by J. A. Wheldon and A. Wilson, appears in the 'Journal of Botany' for September. The only previously-published records appear to be in 'The Naturalist' for 1881, and in Leighton's 'Lichen Flora,' Ed. III.

A valuable paper on 'The Palæontology of the Lancashire Coal Measures, with especial reference to the Collections in the Manchester Museum,' by Mr. H. Bolton, appears in the 'Transactions of the Manchester Geological and Mining Society,' Part 4, Vol. 28, 1904.

In 'The Report of the Southport Meeting of the British Association' Mr. P. F. Kendall gives a valuable summary of records of erratic blocks contained in the reports from 1873 to 1903. In this an alphabetical list appears from which it is easily ascertained what records have been made at any given place.

Mr. G. T. Porritt points out (in the September 'Entomologist') that *Nothochrysa capitata* is not quite so rare as a previous writer supposes. Mr. Porritt has examples from Castle Howard, Doncaster, Huddersfield, Selby, Skipwith, and York, also from Lincolnshire. Possibly it occurs more frequently in Yorkshire than in the southern counties.

A propos of our recent remarks on the nature of Government publications ('Naturalist,' May, p. 134) we notice the following description of a British Geological Survey Memoir given by Sir Arch. Geikie in his recent address to the Geological Society:—'An official pamphlet composed of flimsy paper, badly printed perhaps with old broken type, and sold not infrequently at a prohibitive price.'

Mr. Francis J. Lewis, F.L.S., makes another valuable contribution to the Botanical Survey of the North of England in a paper in the September number of the 'Geographical Journal' (pp. 267-285) on the 'Geographical Distribution of Vegetation on the Basins of the Rivers Eden, Tees, Wear, and Tyne.' The paper is accompanied by an excellent map and fourteen illustrations in the text.

That nature study is doing good in East Yorkshire was amply proved at the recent flower show at Woodmancey, near Beverley, when prizes were given for the greatest number of wild flowers correctly named, etc. These were mostly exhibited by children from the Woodmancey School, where the scholars are taught the English names only and are expected to remember the localities in which they find the specimens. During the past year over 200 species have been gathered, which have been pressed by the schoolmaster, Mr. Affleck, and mounted by the children. At the flower show one scholar had 112 different species correctly named.

Naturalist,



5 OCT. 1904

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PUBLICATIONS RECEIVED.

La Feuille des Jeunes Naturalistes, Journal of Archæology, Entomologist, Nature Notes, for October; Irish Naturalist, September and October; Nature Study, Nautilus, Le Mois Scientifique, for September; New Mexico College of Agriculture Bulletin No. 51; Mem. and Proc. Manchester Lit. and Phil. Soc., Vol. 48, Part 3; Records of the Australian Museum, Vol. 5, No. 4; Report Marlborough College Nat. Hist. Soc., No. 52; Trans. and Proc. Botanical Society of Edinburgh, Vol. 22, Parts 1 and 2; Knowledge and Scientific News, and Annals of Scottish Natural History for October; Journal of Malacology for September.

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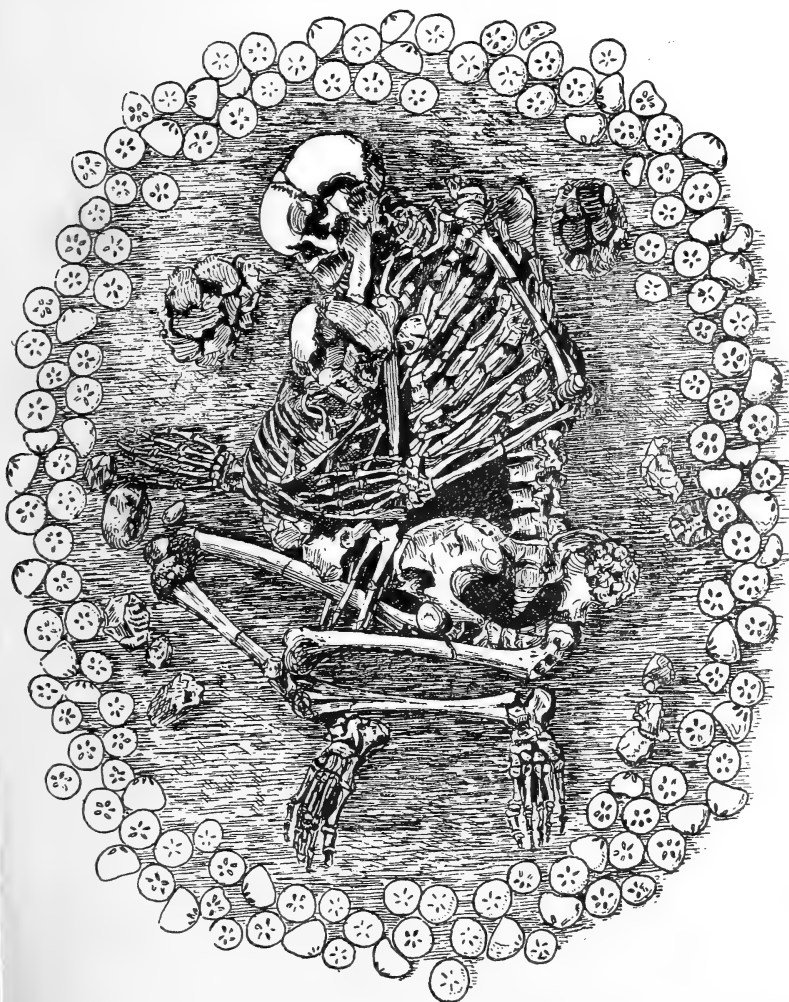
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NOTES AND COMMENTS.

BRITISH ANTIQUITIES.

In recent years the study of the pre-historic antiquities of Britain has received considerable attention ; one result being the appearance of a great number of monographs and scattered papers dealing with the antiquities of particular areas or with some particular phase of pre-historic art. What has been long wanted has now been supplied by Dr. B. C. A. Whindle, F.R.S.,



Skeleton of Woman and Child in Round Barrow.

F.S.A., under the title of 'Remains of the Pre-historic Age in England!'^{*} In this the author summarises the evidences of the handiwork of pre-historic man under different heads, and gives a careful and up-to-date account of stone, bronze, and bone implements, long and round barrows, megalithic remains, earthworks, etc. After each chapter is a list of the various localities (divided under 'counties') in which the objects referred to are known to occur, or have occurred. These lists are exceedingly valuable, and enable the reader to see at a glance what evidence



Jet Necklace from Middleton Moor.

any particular county has supplied. A 'List of Museums containing objects dealt with in this book' is given as an appendix, and is also most useful. Detailed as these various lists are, they might have been made more complete had they been submitted to different archæologists throughout the country. We notice several omissions under 'Yorkshire' for example. The illustrations, by Mrs. Whindle, cannot be grumbled at, though in some cases the original figures might have been used instead of having been re-

drawn. Two of the illustrations we are permitted to reproduce. The first is a plan of a double interment in a round barrow on Dunstable Downs. Judging from the number of chalk echinoderms surrounding this interment, it might contain the ancestors of our friend Dr. A. W. Rowe. The other is a necklace of jet, consisting of four hundred and twenty pieces, which bears many points of resemblance with that on Plate IV. of 'The Naturalist' for June 1903.

GLACIAL MAMMALIA.

In No. 18 of the 'Manchester Memoirs' Professor Boyd Dawkins describes a tooth of *Elephas antiquus* from the Lower Boulder clay at Blackpool. It is waterworn, and 'was derived

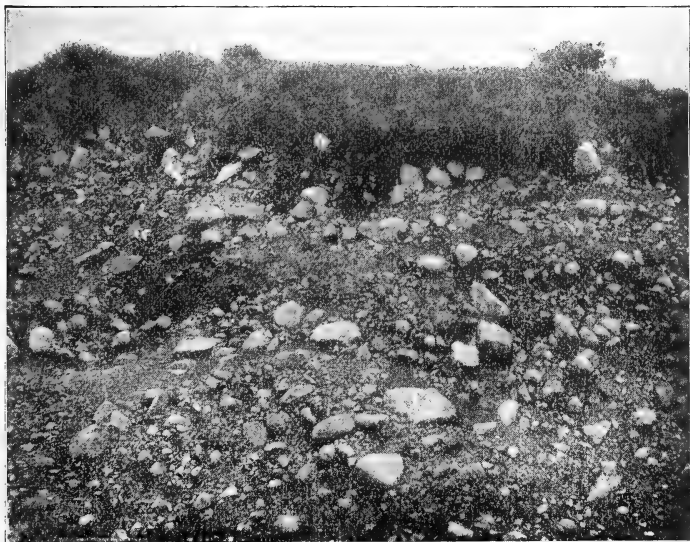
^{*}Methuen & Co., 1904, pp. xv. + 320. 7s. 6d. net.

from the area of land which furnished the supply of boulders, gravel, sand, and clay, or, in other words, the Lake District or Scotland.' Professor Dawkins then cited some half-dozen records of mammoth teeth, etc., as 'the only other cases of the discovery of fossil mammalia in the glacial deposits of Britain' known to him. Surely there is some error here, or else the Professor has taken but little trouble to ascertain what records there are. Yorkshire alone could supply him with *dozens* of instances, particulars of many of which will be found in 'The Naturalist,' the 'Proceedings of the Yorkshire Geological Society,' and other similar publications.

GEOLOGY AND SCENERY.

Straits have I seen that cover now
 What erst was solid earth; have trodden land
 Where once was sea; and gathered inland far
 Dry ocean shells.

A third and cheap edition of Lord Avebury's now well-known 'Scenery of England and the Causes to which it is due' has just



Section of Morainic Mass in Borrowdale.

been issued by Messrs. Macmillan & Co. This will enable all who have not already done so to place this valuable work on their shelves. The present edition is in more handy form for taking on a journey, and appears to contain all the illustrations,

etc., that occur in the larger volumes. In perusing its pages it is apparent that the author has made himself thoroughly familiar with the recent geological literature of the country—nowadays a gigantic undertaking. The book is most fascinating, and the numerous beautiful illustrations greatly add to its value. Several of the latter are from photographs by Mr. Godfrey Bingley, whose name is sufficient guarantee of their excellence.



Morainic Mounds, Honister Pass.

By the permission of the publishers, two illustrations are given herewith. They are from that part of the work relating to the 'Glacial Drift,' and clearly show the care the author has exercised in selecting typical views to illustrate his remarks.

MAMMALS AND BIRDS.

A North Lincolnshire Keeper's Record.—This parish is preserved, and over 5,000 acres are watched over by one keeper. He is a hard-working man, and good trapper. His record from February 1st 1903, to the same date this year, was :—1,200 Rats, 64 Weasels, 42 Stoats, 20 Cats, 30 Magpies, 12 Cadcrows (*C. corone*), 8 Hawks. I have no record of the species. In all 1,376 head.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg.

Naturalist,

NOTES ON THE GROWTH OF SPURN.*

ARTHUR E. BUTTERFIELD, Assoc.M.I.N.A.

SPURN, as is well known, is formed of and maintained by the material eroded from the coast of Yorkshire south of Bridlington, and consists of sand and gravel to a very great depth.

Its position is a variable one and is constantly changing, and there can be little doubt that its first appearance was as an island, and that its connection to the mainland was a more or less gradual process.

In 1660 the high-water mark was evidently not much south of Kilnsea, and Spurn was then nothing but a heap of shingle considerably to the south.

Greenville Collins in his chart of 1684 shows Spurn connected to the mainland, but whether this was so it is difficult to say, as subsequent surveys show Spurn still as an island.

It is of course not at all improbable that a connection to the mainland did exist, and that it was in the absence of protection washed away again.

In 1820 Spurn was only an island at high water, and continued so until 1852. The approach from the mainland was dry at low water in 1820 and gradually increased in height, until in 1852 there were only two places which were submerged at high water spring tides.

In December 1849, during a N.N.W. gale, a serious breach was made in this neck of land about half a mile north of the then high lighthouse. It was 320 yards wide, and at high water, ordinary spring tides, it had 12 feet of water in it. This was evidently caused by a strong set of the ebb tide from the Humber, but it must be noted that this breach never reached in depth to the level of low water spring tides. It was subsequently made good by the deposit of chalk, and it can be easily located by the bank of chalk on the Humber side now.

Spurn with its narrow connecting neck of land has since 1852 been well protected by groynes, and at present shows no signs of yielding to any attacks of the sea.

The movement of Spurn is west and south.

* Read at the Spurn meeting of the Yorkshire Naturalists' Union, 2nd July 1904.

Shelford, in his paper on the 'Outfall of the Humber,' says that from 1676 to 1851 the movement was 2,530 yards south, or 44 feet per annum, and I find that from 1851 to 1888 the high water line has advanced 600 feet in a southerly direction, or at the rate of 17 feet per annum.

The westerly movement between 1851 and 1888 has been at the rate of 8 feet per annum on the east or North Sea side, and 17 feet per annum on the west or Humber side, showing that the Point has increased considerably in width.

The tide at Spurn flows for six hours and ebbs for six hours. Spring tides reach a level of 10 feet above Ordnance datum at high water, and ebb to a level of 8·8 below Ordnance datum. Neap tides flow to a height of 6·5 feet above Ordnance datum, and ebb to 3·5 feet below Ordnance datum.

North of Spurn and its sand dunes is the Boulder Clay at Kilnsea Warren. Here the ravages of the sea are more apparent.

From 1852 to 1888 the erosion has been going on at the average rate of 12 feet per year from Easington Lane End to this point.

The writer surveyed this coast in 1898 and found that from 1852 to that date the average loss along this stretch of sea front had been at the rate of 10 feet per annum.

The Blue Bell Inn was built in 1847, distant from the cliffs 1,602 feet; in 1852 it was 1,580 feet away. The Ordnance Survey of 1888 shows it 1,110 feet away, and when the writer measured it in 1898 the distance between it and the cliffs was only 1,000 feet. Similarly at Easington Lane End and at the Kilnsea Beacon, the measurements of which are as follows:—

	Loss.		Loss.
	1852-1886.		1852-1898.
Easington Lane End ...	320 feet.	...	420 feet.
Kilnsea Beacon	530 „	...	680 „

This erosion is without doubt a serious matter for owners of land in this neighbourhood, and one cannot but regret that some scheme has not yet found favour for the prevention of this awful waste.

It has been said that the risk of damage to the Humber by a breach at this place is considerable, but apparently those who hold this opinion do not distinguish between erosion and submersion. That a breach at high water could be made is indisputable, but this would only be a submersion at high water.

Between the channel of the Humber and Kilnsea are huge stretches of clay foreshore, and this in addition to the land at Kilnsea would have to be cut through down to low water level before any great alteration could be made to the Humber channels.

Closely allied with this coast erosion is the question of the origin of the mud in the Humber, and since Poulson wrote in 1849 that it came from the coast of Holderness he has been frequently quoted.

The writer has personally gone into the subject, and he is satisfied from the results of his own experiments that the opposite is the case.*

The duration of the ebb compared to the flood is so great that it would be impossible for any material to work up against it. At Hull the ebb runs $7\frac{1}{4}$ hours and the flood five hours, and material in suspension in the Humber at Hull would be 11 miles nearer Spurn after one complete ebb and flood than it was before, taking into consideration the relative velocities.

The flood tide is the great scouring agent, but it is the ebb tide which is the predominant factor in conveying any eroded material out to sea, as it has the increased velocity due to the fresh water.

Again, the cliffs of Holderness are not reached by the tide until close upon high water, and before any eroded material could find its way into the Humber the ebb would have commenced, and the direction of the tidal currents at Spurn are such, that it having once been carried from the Humber mouth it could never return to it again.

Analysis of Humber water† shows that at Spurn there is very little silt but a large quantity of salt, whereas at the other end of the Humber the reverse is the case. It is therefore reasonable to suppose that the end of the river which contains the most material in suspension is that nearest its place of origin.

Material in solution is more easily transported than material in suspension; how then the absence of salt?

If the river derived its mud from outside it must have been filled up long since, as the erosion of the coast has always been going on.

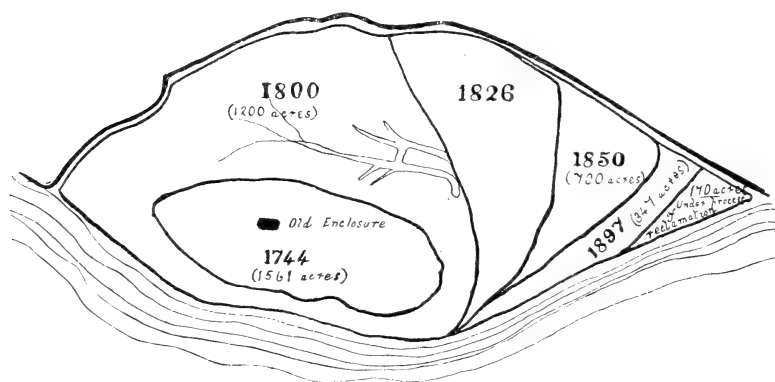
* 'Circumstances relative to the Suspension and Deposit of Detritus in the River Humber.' 12 pp. Privately printed, 1903.

† High water samples.

To the west of Spurn lies that part of the Humber shore known as Sunk Island. It was originally an island, but is not now, having been attached to the mainland.

In 1660 its locality was marked by two huge sandbanks with a deep channel between them, and shortly after this channel began to silt up and the sandbank pushed itself above the level of high water. In 1684 seven acres were enclosed, and shortly after 1728 the channel at the back closed up completely. In 1744 1,561 acres had been enclosed, and by 1850 7,000 acres had been embanked.

Further reclamations have since been made, and Mr. Geo. Bohn, M.Inst.C.E., the Engineer for the Crown, is at present engaged in warping up another large tract of foreshore. By the plan will be seen the nature and date of the various reclamations.



Sunk Island.

Needless to say this reclaimed land is second to none in England either for arable or pasture.

The following details are from a boring made by Messrs. Easton & Amos in 1846 at Sunk Island:—

Alluvial Soil	...	...	5 feet.
Sand...	...	...	30 "
Clay ...	...	...	9 "
Silt and Water	...	...	14 "
Chalk, Clay, and Stones...	...	...	17 "
Gravel	...	...	30 "
Clay ...	...	...	5 "

Chalk reached at 110 feet below the surface.

FUNGUS FORAY AT ROKEBY.

CHARLES CROSSLAND.

THE 13th Annual Fungus Foray (the 184th Union Meeting) was held at Rokeby, W. North Riding, 24th to 29th September, for the investigation of Rokeby, Brignall Banks, Deepdale and Pecknall. The headquarters were at the Morritt Arms Hotel, Greta Bridge, in close proximity to Rokeby Park and woods. The immediate vicinity on the banks of the Greta and the far-famed Tees is a most charming district, made classic ground by both Scott and Dickens. This somewhat remote Yorkshire locality on the borders of Durham was selected at the last foray mostly because up to that time W.N.R. had been almost entirely neglected for its fungi. The only records, beyond a few solitary instances, are those made by Mr. Gibbs at the Bowes Excursion, August 1903 ('The Naturalist,' September 1903), when about 80 species were noted. Masham and Swinton had been worked, certainly, but these places lie on the borders of the West Riding.

The party assembled at the hotel on the Saturday afternoon, and consisted of Harold Wager, F.R.S., Derby; W. N. Cheesman, F.L.S., Selby; Thomas Gibbs, Wirksworth; C. H. Broadhead, Thongsbridge; R. H. Philip, Hull; R. Gilchrist, Scarborough; J. W. H. Johnson, B.Sc., Thornhill; J. J. Burton, Nunthorpe; and the writer. No addition was made during the week. Mr. G. Massee, F.L.S., V.M.H., the Chairman of the Mycological Committee, and Mr. A. Clarke were unfortunately unable to be present, and their absence was much regretted.

After dinner it was too late in the evening to make any attempt at collecting. Mr. Cheesman, however, had brought some gatherings from Skipwith and Hemingborough, including *Schizophyllum commune*; these, along with a basket of specimens gathered by Mr. Johnson near Greta Bridge in the early part of the day, sufficed for the evening's inspection and discussion.

The somewhat long spells of fine weather had caused some doubts to arise as to whether the harvest of fungi would be a good one. In any case the district is so lovely and of such a pastoral and woodland a nature that, had no work been found to do, which is almost out of the question with a true mycologist, a pleasant holiday of kindred spirits might have been spent in it.

On the recommendation of Mr. W. Harrison Catterall, the able Rokeby schoolmaster, the opening day was spent in a compact

little round embracing pasture, park, and woodland, commencing within 100 yards of the hotel. A full set of convenient hand baskets were supplied by the host on 'spec' of finding some plunder. On crossing the first field many ordinary pasture species were straightway met with; a tree-bordered trench on rising ground at the far end of the field proved most prolific, especially in micro species, on the fallen beech twigs and leaves lodged in the hollow. When the wood was reached two of the younger members scaled the rather high wall and had a 'dip in' to test the quality of the place for our purpose. It proved good, and immediately pieces of half-rotten branches were handed over the wall for inspection; most of these were literally covered with fungi of one kind or another, a good sign of the moist nature of the ground. The wood was skirted until a suitable corner was reached where the whole party, by the aid of a friendly field-fence, easy to mount, climbed in. Near this corner was a heap of moist rotting branches, very productive. Many samples from these were deposited in the baskets for later examination. A reference to a six inch Ord. Map showed this (Mortham) wood to be rather extensive, covering between 22 and 23 acres, and situated on a piece of land washed on one side by the Tees, on another by the Greta, and running to a point at the 'meeting of the waters' near the Dairy Bridge. The whole wood, so far as we could cover it, proved to be an ideal place for our purpose; nearly every bit of stick picked up had something on it, some bits a good many things. *Chlorosplenium æruginosum* was there in its full glory. There was an entire absence of bracken. There was a sprinkling of Dog's Mercury, scattered beds of Nettles, and here and there small beds of *Airu cæspitosa*, the latter of which, along with a few slightly spongy mossy places, clearly demonstrated the naturally moist character of the wood, the very opposite of those crack-soil arid woods one occasionally has the misfortune to drop into. It is a mixed wood, the principal trees being Wych-elm, Oak, Beech and Sycamore. It was found to be a veritable paradise for *Mycenas* and *Myxos*. There were a few, but not many, of the larger fleshy species. The time to return homeward with the spoils arrived before half the area of this rich ground had been even superficially gone over. Yet so many things had been collected that one began to feel shy of taking more. The park was entered by a private wood bridge, over the Greta, belonging to Rokeby Hall, a corner of the park crossed, and exit made at the lodge gate within 30 or 40 yards of the headquarters. Just

inside the gates some fine old Beech stumps, some in their natural position, others uprooted by the blowing down of the trees, were overhauled. Many stump species, such as *Mycena galericulata*, *M. rugosa*, *Collybia velutipes*, *Coprinus micaceus*, *Psathyrella disseminata*, were here in abundance. On one flaps of *Polyporus giganteus* were forming; another was being covered by the fleshy wrinkles of *Stereum purpureum*; another appeared to be surrounded by a fungus 'flower garden': scores upon scores of full-blown *Otidea aurantia*, three or four inches across, were growing from the soil among short grass on and about it. At bedtime the day's work totted up to 130 known species with 30 or 40 left over undetermined.

The second day was devoted to Brignall Banks; the woods here were more steep and difficult to work than Mortham, yet, as may be seen by the accompanying record, the results there were excellent, although some of the best ground was not reached till late in the day, and was consequently only partially worked. On Tuesday several broad belts of Beech and Holly plantations close by home well repaid investigation. A strip of woodland along the Tees side as far as the Abbey Bridge was not so prolific, but here were found *Tricholoma sulphureum*, *T. leucocephalum*, *Pleurotus pantoleucus*, and *Pluteolus reticulatus*.

On Wednesday morning a second visit was paid to the park and Mortham Wood, and a few additions made. In the afternoon Mr. Catterall conducted a party to a firwood by Tutta Beck, where many fresh things were met with, including the lovely little deep-steel-blue *Mycena*, *M. iris*, *Tricholoma imbricatum*, and an uncommon Discomycete, *Lachnea albo-spadicea*.

Considering the amount of material obtainable close at hand it was not deemed necessary to visit either Deepdale or Pecknall. Mr. Gibbs, staying at Barnard Castle over Friday, had a short turn in Thorsgill and added *Collybia butyracea*, *Peziza lividula*, *Ciboria ochroleuca*, *C. luteovirescens*, and the rare and beautiful little *Mycena*, *M. elegans*.

Among what we considered the rarer species are *Corticium coeruleum* and *Cribraria purpurea*. The well-marked *Belonidium Clarkei*, first found by Mr. A. Clarke at Mulgrave Woods F.F. 1900, figured and described in 'The Naturalist,' June 1901, turned up in abundance on decaying wood both at Mortham and Greta Bridge.

Many genera of the commoner kinds were poorly represented, some not at all. Of *Amanita* there was only *A. rubescens*;

Leptonia, one ; *Cantharellus*, none ; *Paxillus involutus*, a single specimen ; *Cortinarii*, rare ; *Boleti*, three specimens, and so on. On the other hand, the small shade-loving species were rather plentiful, the genus *Mycena*, for example, being represented by 23 species. Rain had been needed to bring fleshy species forward, but such weather as suits the fungus man does not suit the farmer, especially with late corn crops, so that, from an economic point of view, the best happened. Heavy dews will help them on now if frost keeps away.

The pastures were in splendid 'heart.' The almost entire absence of 'fairy rings' was observed upon. Only about a couple specimens of *Marasmius oreades* were noted. The *Hygrophori* were well represented, 15 species being collected. Mushrooms, both the ordinary and the horse mushroom, were not at all scarce. In the woods, under the hollies, *Marasmius Hudsoni* was fairly common ; this cannot always be said of this delightful spineclad agaric.

Although the district is so extensively wooded very little timber disease, compared with what we have seen in some other localities, exists. We only saw about a couple of Ash trees attacked by *Pholiota squarrosa* ; one by *Polyporus hispidus* ; one by *P. sulphureus* ; one Birch by *P. betulinus* ; and one Oak by *Fistulina hepatica*. *P. squamosus* was brought in from somewhere. *Dasyscypha calycina* was very rare among the Fir trees. *Armillaria mellea* was in force about some new stumps, and the *mycelium* was taken from beneath the bark of a fallen tree. Of course, all these denote the presence of disease, but there was little of it comparatively. Ash and Beech are the prevailing timber trees ; many of both have grown to an enormous size, and, judging by the absence of stag's-horn tops, are quite healthy. No trace of the Beech parasite, *Armillaria mucida*, was seen. One notable feature was the immense amount of *Tremella mesenterica* on fallen Beech branches.

The vegetation generally appeared to be healthy ; comparatively few Uredines or moulds were met with.

The weather was all that could be desired for collecting purposes. There were several heavy downpours of rain which freshened things, especially the more delicate species, such as *Bolbitius* and *Coprinus* sp. Fortunately for us they came during the night. We were only caught in one shower, but this was in Mortham Wood, amid good shelter, with a pile of sticks at the foot of a mossy bank to go at the while.

Notwithstanding the non-appearance of 'heaps of big stuff,' there was such a quantity of other kinds, that it was impossible to cope with it all. Much that was likely to keep a few days was brought away, and a box sent to Mr. Massee at Kew. One wishes these things were as obliging as mosses, and could be put away to be brought out again as fresh as ever for examination, but they are not. Two days were spent indoors by one member, and one by another, working at the material brought in. Table work commenced each morning at or before seven.

There being one or two young mycologists present, it was thought it would be instructive to them to lay on tables the named specimens, so that they might be referred to again and again, and thus be better fixed in memory. A convenient granary across the yard, at our disposal, with two or three long tressle tables set up in it, answered wonderfully well for this purpose. Mr. Cheesman and Mr. Broadhead were specially energetic in this direction.

The host had two immense specimens of *Lycoperdon giganteum* on the beams in the granary in the process of drying. He informed us he gathered samples each season for the purpose of smoking his bees when he takes out the honeycombs. He stated that the light, spongy inside (capillitium and spores), is much preferable to either brown paper or anything else he has tried. It is placed in a little funnel, to which a small pair of bellows are attached, set fusing, and the smoke blown into the hive. The bees are thus stupified sufficiently long to allow of the combs being withdrawn.

The usual sampling of a few edible species was indulged in; dishes of *Agaricus arvensis*, the horse mushroom; *Tricholoma personatum*, blewitts; and *Hygrophorus niveus*, ivory caps, being prepared. All were daintily cooked, and those who had not before tasted ivory caps especially are looking forward to the time when opportunity will afford them a similar tit-bit.

Part of each evening was devoted to papers on various mycological subjects. Mr. Wager gave a most interesting address on 'Recent Observations on Nuclear Fusion and Division in the Basidiomycetes,' an abstract of which will appear in a future issue. Mr. Gibbs dealt with the 'Classification of Fungi,' the classified exhibits in the granary admirably suiting his purpose. Mr. J. H. Holland, F.L.S., The Museum, Kew Gardens, sent an extremely interesting and useful contribution (Part III) on 'Economic Fungi.' The Secretary detailed the

fungi found by Mr. J. Needham and himself on a cast out cloth-tab hearthrug during the process of its decay in a damp wood. Collections of coloured drawings of fungi by Mr. Gibbs and the writer were on the tables.

At the business meeting a hearty vote of thanks was passed to the landowners who had kindly given permission for their estates to be visited; also to Mr. Catterall for so heartily devoting himself, so far as his duties allowed, to the interests of the Foray.

355 species have so far been determined.

The Officers and Committee were re-elected.

Roche Abbey and Maltby Woods district, near Rotherham in S. W. Yorks., is to be recommended to the Union Executive for the 1905 Foray.

Three new members were elected.

In every way the meeting was successful and enjoyable; the ground was productive of good things mycologically; the neighbourhood was one of the most charming we have yet visited; and last, but by no means least, the accommodation at the Morritt Arms was most excellent both for work and personal comforts; indeed, it was by far the best it has yet been our fortune to secure, and we are much indebted to Mr. Burton for recommending its selection.

In the following list, R. = Rokeby; B. = Brignall Banks; T. = Thorsgill.

BASIDIOMYCETES.

(GASTROMYCETES.)

Crucibulum Tul.

C. vulgare. R.

Sphærobolus Tode.

S. stellatus. R., B.

On decaying twigs.

Lycoperdon Tournf.

L. gemmatum Batsch. B.

L. pyriforme Schæff. R.

About dead sticks in moss.

L. bovista L. R.

In pasture.

L. nigrescens Vitt. R.

In pastures.

Scleroderma Pers.

S. verrucosum Pers. R.

In a wood.

Mutinus Fr.

M. caninus (Huds.). R.

On mossy stump.

(HYMENOMYCETES.)

AGARICACEÆ.

Agariceæ.

Leucosporæ.

Amanita Pers.

A. rubescens Pers. R., B.

On the ground in woods.

Lepiota Fr.

L. cristata (A. & S.). R.

Among grass.

L. granulosa (Batsch.). B.

L. amianthina (Scop.). B.

Armillaria Fr.

A. mellea (Vahl.). R., B., T.

At the base of living trees and on new stumps.

Tricholoma Fr.

T. imbricatum Fr. R.

In fir wood.

T. terreum (Schæff.). R.

On the ground in mixed wood.

T. saponaceum Fr. R.
T. sulphureum (Bull.). R.
 On the ground in mixed wood.

T. albellum Fr. R.
 On ground in mixed wood.

T. leucocephalum Fr. R., B.

T. personatum Fr. R., B.
 In pastures.

T. sævum Gillet. B.
 In 'fairy ring' in pasture.

Clitocybe Fr.

C. phyllophila Fr. R.
 Among beech leaves.

C. galinacea (Scop.). R.
 In pasture skirting a wood.

C. maxima Fr. R.

C. geotropa (Bull.). R.
 In woodside pasture.

C. brumalis Fr. R.
 In a wood among dead leaves.

C. fragrans (Sow.). R., B.
 Among grass.

C. laccata (Scop.). R., B.
 On the ground.

Collybia Fr.

C. radicata (Bull.). R.
 On old stumps.

C. platyphylla Fr. R.

C. maculata (A.&S.). R.
 On the ground among dead leaves, etc.

C. butyracea (Bull.). T.

C. velutipes (Curt.). R.
 On living trees and on newly cut stump.

C. confluens (Pers.). B.
 In a wood among dead leaves.

C. nummularia Fr. R.
 Among grass.

C. dryophila (Bull.). R.
 Among dead leaves.

Mycena Pers.

M. elegans Pers. T.
 In fir wood.

M. rugosa Fr. R.
 On dead trunk.

M. flavo-alba Fr. R.

M. galericulata (Scop.). R., B.
 On decaying stumps.

Var. *calopoda* Fr. B.
 On decaying stumps.

M. polygramma (Bull.). B.
 On stump.

M. pullata B.&Cke. R.

M. alcalina Fr. R.
 On rotting branch.

M. ammoniaca Fr. T.
 On the ground in wood.

M. stannea Fr. R.

Among grass.

M. filopes (Bull.). R.

Among dead leaves.

M. iris (Berk.). R.

On decaying fir branch and needles.

M. amicta Fr. R.
 Among decaying leaves and grass.

M. acicula (Schæff.). R.
 On rotten twig.

M. hæmatopoda Fr. R., B.

On decaying branches.

M. sanguinolenta Fr. R., T.
 Among dead leaves in fir wood.

M. galopoda Fr. R., B., T.
 Among rotting twigs, leaves, etc.

M. epipterygia Fr. B.
 Among grass in fields.

M. citrinella Pers. R.
 On decaying fir twigs and needles.

M. rorida Fr. R.

Among rotting twigs.

M. stylobates Pers. R.

On dead twigs, leaves, etc.

M. discopoda Lev. R.

M. hiemalis (Osbk.) R.

On decaying oak branch.

M. capillaris (Schum.). R., B.

On dead beech leaves.

Omphalia Fr.

O. umbellifera Linn. R.

On moist bank.

O. fibula (Bull.). R., B.

On bank among moss.

O. bullula Brig. B.

O. integrella (Pers.). B.

On dead twigs.

Pleurotus Fr.

P. pantoleucus Fr. R.

On trunk, stream side.

P. revolutus (Kickx.). R.

P. applicatus (Batsch.). R.

On dead twigs.

Rhodosporeæ.

Pluteus Fr.

P. cervinus (Schæff.). R., B.

About rotting stumps.

P. phlebophorus (Dittm.). R., B.

On rotten wood.

Entoloma Fr.

E. prunuloides Fr. R.

Among grass under trees in the park.

E. jubatum Fr. R., B.

Common in pastures.

E. sericellum Fr. B.

E. sericeum (Bull.). R., B.

In pastures.

Leptonia Fr.

L. lampropoda Fr. R.

In pasture.

Nolanea Fr.

N. pascua (Pers.). R., B.

In pastures.

N. pisciodora (Ces.). R.

On naked soil on bank of stream.

Ochrosporeæ.

Pluteolus Fr.

P. reticulatus (Pers.). R.

On decaying wood.

Pholiota Fr.

P. erebia Fr. R.

On soil.

P. togularis (Bull.). B.

P. squarrosa (Müll.). R., B.

At the trunk base of living ash.

P. adiposa Fr. B.

On beech trunk.

P. mutabilis (Schæff.). R., B.

On rotting stumps.

P. marginata (Batsch.). R., B.

P. unicolor (Fl. Dan.). R.

On decaying branch.

Inocybe Fr.

I. rimosa (Bull.). R., B.

In a wood among grass.

I. geophylla (Sow.). R., B.

Among grass in woods.

Hebeloma Fr.

H. crustuliniforme (Bull.). R.

H. longicaudum (Pers.). R.

Flammula Fr.

F. inopoda Fr. R.

Among decaying fir branches.

F. sapinea Fr.

On decaying trunks.

Naucoria Fr.

N. semiorbicularis (Bull.). R.

In pastures.

Galera Fr.

G. tenera (Schæff.). R., B.

In pastures.

G. hypnorum (Batsch.).

Among moss on banks.

Tubaria Sm.

T. furfuracea (Pers.). R.

T. inquilina Fr. B.

On decaying twigs.

Crepidotus Fr.

C. mollis (Schæff.). R., B.

On dead branches.

Bolbitius Fr.

B. flavidus (Bolt.). R., B.

B. titubans (Bull.). R.

In rich pasture.

Cortinarius Pers.

C. (Phleg.) varicolor Pers. R.

C. (Inol.) violaceus L. B.

C. (Derm.) cinnamomeus (L.). B.

C. (Tela.) hinnuleus Fr. R.

C. (Tela.) punctatus Pers. B.

C. (Tela.) rigidus Fr. R., B.

C. (Tela.) paleaceus Fr. B.

C. (Hygr.) acutus (Pers.). R., B.

All on the ground in woods.

Melanosporæ.

Agaricus L.

A. arvensis Schæff. R., B.

Common in pastures.

A. campestris L. R., B.

In pastures.

A. comptulus Fr. B.

On the ground in a wood.

Stropharia Fr.

S. æruginosa (Curt.). R., B.

On the ground in woods.

S. albo-cyanea (Desm.). R.

S. inuncta Fr. B.

S. stercoraria Fr. R., B.

S. semiglobata (Batsch.). R., B.

The last four in pastures.

Hypholoma Fr.

H. sublateritium (Schæff.). R.

On stumps.

H. capnoides Fr. R.

On stump in fir wood.

H. fasciculare (Huds.). R., B.

On stumps.

H. dispersum Fr. R.

In a fir wood.

H. lacrymabundum Fr. R.

On the ground.

H. hydrophilum (Bull.). R.

In a fir wood.

Panæolus Fr.

P. phalænarum Fr. R., B.

P. campanulatus (L.). R.

P. fimicola Fr. R.

Last three on dung in pastures.

Anellaria Karst.

A. separata L. R., B.

A. fimiputris (Bull.). R., B.

On dung in pastures.

Psilocybe Fr.

P. semilanceata Fr. R., B.

In pastures.

P. spadicea Fr. R.

On stumps.

P. cernua (Müll.). B.

On rotten wood.

P. fœnisecii (Pers.).

In pastures.

Psathyra Fr.

P. conopilea Fr. R.

Psathyrella Fr.

P. subatrata Fr. R.

P. gracilis Fr. R.

P. disseminata (Pers.). R.

In crowds on tree stumps.

P. atomata Fr. R.

Among grass on border of wood.

Coprinus Pers.

C. atramentarius Fr. R.

C. micaceus (Bull.). R., B.

On dead stumps.

C. lagopus Fr. R.

On the ground in moist mixed plantation.

C. radiatus (Bolt.). R., B.

C. Gibbsii Mass. & Crossl. R.

C. ephemerus Fr. R.

Last three on dung in pastures.

C. plicatilis (Curt.). R.

C. hemerobius Fr. B.

Among grass.

Paxilleæ.

Paxillus Fr.

P. involutus (Batsch.). R.

Hygrophorus Fr.

H. eburneus (Bull.). B.

H. pratensis (Pers.). R., B.

H. virgineus (Wulf.). R., B.

H. niveus (Scop.). R., B.

H. ceraceus (Wulf.). B.

H. coccineus (Schæff.). R., B.

H. miniatus Fr. R.

H. puniceus Fr. R., B.

H. obruzeus Fr. R.

H. conicus (Scop.). R., B.

H. calyptræformis Fr. R., B.

H. chlorophanus Fr. R., B.

H. psittacinus (Schæff.). R., B.

H. unguinosus Fr. R.

H. nitratus (Pers.). R., B.

All in pastures.

Lactariææ.

Lactarius Fr.

L. turpis (Weinm.). R.

L. blennius Fr. R., B.

L. pallidus (Pers.). R.

L. quietus Fr. R., B.

L. rufus (Scop.). B.

L. glycosmus Fr. R., B.

L. subdulcis (Bull.). R., B., T.

L. camphoratus Fr.

All on the ground in or near to woods.

Russula Pers.

R. nigricans (Bull.). R.

R. chloroides (Kromb.). R., B.

R. cutefracta Cke. R.

R. cyanoxantha (Schæff.). R., B.

R. emetica Fr. B.

R. ochroleuca Fr. R., B.

R. fragilis Pers. R., B.

R. ochracea A. & S. R.

All on the ground in or near woods.

Marasmiææ.

Marasmius Fr.

M. peronatus (Bolt.). R., B.

In woods among leaves.

- M. oreades* (Bolt.). R.
In pasture.
M. ramealis (Bull.). R., B.
M. rotula (Scop.). R., B.
M. androsaceus Fr. R., B.
The three preceding on dead
twigs, etc.
M. Hudsoni (Pers.). R., B.
On dead holly leaves.
M. epiphyllus Fr. R.
On dead leaves.

Panus Fr.

- P. conchatus* Fr. R.
On stumps.

POLYPORACEÆ.***Boleteæ.*****Boletus** Dill.

- B. flavus* L. R.
B. chrysenteron Fr. R.
B. subtomentosus L. R.

Fistulina Bull.

- F. hepatica* Fr. B.
On living oak.

Polyporeæ.**Polyporus** Mich.

- P. squamosus* Fr. R., B.
On living ash.
P. varius Fr. R.
On dead twigs.
P. giganteus Fr. R., B.
Common on newly-cut stumps.
P. sulphureus Fr. R.
On living ash.
P. hispidus Fr. R.
On living ash.
P. nidulans Fr. R.
On fallen branches.
P. betulinus Fr. B.
On living birch.
P. fumosus Fr. R.
On stumps.
P. chioneus Fr. R., B.
On stump.
P. cæsius Fr.
Polystictus Fr.
P. versicolor (Huds.). R., B.
Fomes Fr.
F. annosus Fr. B.
In fir wood.

- F. resupinatus* (Bolt.) Mass. R., B.
F. ferruginosus (Fr.) Mass. R.
On dead trunk.

Poria Pers.

- P. vaporaria* Fr. R., B.
Common on dead sticks.
P. blepharistoma B. & Br. R.
Dædalea Pers.
D. quercina (L.). R., B.
On oak stumps.
D. confragosa Pers. B.

HYDNACEÆ.**Hydnum** L.

- H. repandum* L. B.
H. Stevensoni B. & Br. R.
H. argutum Fr. B.
Caldesiella Sacc.
C. ferruginosa (Fr.). B.

Phlebia Fr.

- P. vaga* Fr. R.
P. contorta Fr.

Grandinia Fr.

- G. granulosa* Fr. R., B.
Odontia Pers.

- O. fimbriata* Pers. B.
The preceding seven all on dead
branches or trunks.

CLAVARIACEÆ.**Clavaria** Vaill.

- C. muscoides* L. R.
C. cinerea Bull. R.
C. cristata Holmsk. R.
C. rugosa Bull. B.
C. fusiformis Sow. R.
C. inæqualis Fl. Dan. B.
C. vermicularis Scop. R.

THELEPHORACEÆ.**Stereum** Pers.

- S. hirsutum* Fr. R., B.
S. purpureum Pers. R., B.
On upturned stumps.
S. sanguinolentum. R., B.
On dead branches in very moist
places.

Corticium Fr.

- C. calceum* Fr. R.
On dead branches.
C. sanguineum Fr. R., B.
C. coeruleum Fr. R.
On wood near the old Abbey.

Hymenochaete Lév.*H. tabacina* Lév. R.

On fallen trunks.

Cyphella Fr.*C. Pimii* Phil. R.

On decaying herbaceous stems.

C. capula Fr. R., B.Rather common on dead herbaceous stems. Somewhat similar to *C. Pimii*, but in that sp. the spores are longer and subpyriform.*C. villosa* Karst. R.*C. albo-violascens* Karst.

Both on dead wood.

TREMELLACEÆ.**Exidia** Fr.*E. glandulosa* Fr. B.

On dead oak branches.

E. albidia Bref. B., T.**Tremella** Dill.*T. mesenterica* Retz. R., B., T.

Very common on dead beech branches.

Calocera Fr.*C. viscosa* Fr. R.

On stump in fir wood.

C. cornea Fr. R., B.**Dacryomyces** Nees.*D. deliquescens* Duby. R.*D. stillatus* Nees. R., B.*D. torta* (Berk.) Mass. B.

All on dead wood.

UREDINACEÆ.**Melampsoreæ.****Melampsora** Cast.*M. circææ* (Schum.). B.On *Circæa lutetiana*.**Coleosporium** Lév.*C. sonchi* (Pers.). R.On *Petasites officinalis*.**Puccinææ.****Uromyces** Link.*U. rumicis* (Schum.). R.On *Rumex*.*U. alchemillæ* (Pers.). B.On *Alchemilla vulgaris*.**Puccinia** Pers.*P. prenanthis* (Pers.). R.On *Lactuca muralis*.*P. violæ* (Schum.). B.On *Viola*.*P. menthæ* Pers. B.

On wild and garden mint.

P. saniculæ Grev. R.On *Sanicula europæa*.*P. poarum* Niels. R.Æcidium on *Tussilago Farfara*.*P. hieracii* (Schum.). R., B.

On thistle.

P. oblongata (Link.). R.On *Luzula maxima*.*P. glomerata* Grev. B.On *Senecio Jacobæa*.*P. veronicæ* (Schum.). R.On *Veronica montana*.**Phragmidium** Link.*P. subcorticatum* (Schränk.). R.

On the leaves of cultivated rose in garden.

Uredo Pers.*U. agrimonis* DC. B.On *Agrimonia eupatoria*.**USTILAGINACEÆ.****Ustilago** Pers.*U. violacea* (Pers.). R., B.On the anthers of *Lychnis diurna*.**ASCOMYCETES.****(PYRENOMYCETES.)****Sphærotheca** Lév.*S. pannosa* Lév. R.**Erysiphe** Hedw.*E. polygoni* DC. = *E. Martii* Lév. R.On *Heracleum sphondylium* and *Anthriscus sylvestris*.*E. cichoracearum* DC. R.On *Arctium majus*.**Sphærella** C.&D.*S. rumicis* Desm. R.On *Rumex obtusifolius*.**Leptosphæria** DC.*L. doliolum* (Pers.). R.**Melanomma** Fckl.*M. pulvis-pyrus* (Pers.). R.**Lasiosphæria** C.&D.*L. spermoides* (Hoff.).*L. ovina* (Pers.).**Hypoxyton** Bull.*H. fuscum* Fr. R.

On beech branches.

Xylaria L.

X. hypoxylon L. R., B., T.

X. polymorpha Grev. R.

Eutypa Tul.

E. lata Tul. R., B.

Very common.

Diatrype Fr.

D. disciformis Fr. R., B.

On fallen beech branches.

Phyllachora Fckl.

P. graminis (Pers.) B.

On living leaves of *Brachypodium*.

P. junci Fr. R.

On dead rushes.

Nectria Fr.

N. cinnabarina (Tode). R., B.

N. sanguinea (Bolt.) B.

(DISCOMYCETES.)**HELVELLACEÆ.****Helvella** L.

H. lacunosa Afz. R.

PEZIZACEÆ.**Peziza** Dill.

P. lividula Phil. T.

On the ground.

Otidea Pers. in part.

O. aurantia (Pers.) R.

In great profusion about old stump inside the lodge gate.

Humaria Fr.

H. granulata (Bull.).

Very common on cow dung.

Lachnea Fr.

L. umbrata (Fr.) R.

On the ground.

L. coprinaria (Cke.) R.

L. stercorea (Pers.) Gillet. R.

Both on cow dung.

L. setosa (Nees.) R.

L. scutellata (L.) B., R.

Both on rotten wood.

L. albo-spadicea (Grev.) R.

On the ground.

Ciboria Fckl.

C. ochroleuca (Bolt.) T.

On decaying oak twigs.

C. luteovirescens (Rob.) T.

On decaying leaf-petioles, etc.

Helotium Fr. (in part).

H. claro-flavum (Grev.) R.

H. ferrugineum (Schum.) R.

H. citrinum (Hedw.) R., B.

Also var. *pallescens* Mass. R.

H. virgultorum (Vahl.) R.

All five on dead branches.

H. moniliferum (Fckl.) R.

On sawn surface of stump.

H. cyathoides (Bull.) R., B.

H. scutulum (Pers.) B.

H. herbarum (Pers.) B.

The three on dead herbaceous stems.

H. epiphyllum (Pers.) R., T.

On oak and beech leaves.

H. renisporium Ellis. R.

On petioles and veins of decaying oak leaves.

H. fagineum (Pers.) R., B., T.

Common on beech mast.

Cyathicula DeN.

C. coronata (Bull.) B.

On dead stems of nettle.

Chlorosplenium Fr.

C. æruginosum Æd. R.

On dead wood.

Mollisia Fr.

M. cinerea (Batsch.) R., B., T.

Common on dead wood and branches.

M. lignicola Phil. R.

On dead wood.

M. atrocinerea. R.

On dead stem of *Angelica*.**Pseudopeziza** Fchl.

P. benesueda (Tul.) Mass. B.

On dead alder twigs.

Tapesia Pers.

T. fusca (Pers.) R., B.

T. cæsia (Pers.) R.

On decaying oak wood.

Dasyscypha Fr.

D. virginea (Batsch.) R., B.

On dead twigs; also on beech mast.

D. nivea (Hedw.) R.

D. hyalina (Pers.) R., B.

On wood.

D. calycina Fckl. R.

On larch twigs.

Belonidium M.&D.

B. Clarkei Mass.&Crossl. R.

Abundant on wet decaying branches.

B. pruinosa (Jerd.). B.

On branches encrusted with *Eutypa lata*.

Erinella Sacc.

E. apala (B.&Br.). B.

On decaying *Juncus*.

ASCOBOLACEÆ.

Ascophanus Boud.

A. argenteus (Curr.). B.

On cow dung.

A. carneus (Pers.). R.

On cow dung, and also decaying sacking.

Ascobolus Pers.

A. vinosus Berk. R.

On rabbit dung.

A. furfuraceus Pers.

Common on cow dung.

DERMATIACEÆ.

Cenangium Fr.

C. dryinum (Cke.) Mass. R.

On dead oak branches.

BULGARIACEÆ.

Bulgaria Fr.

B. polymorpha (Æd.). R.

Orbilina Fr.

O. vinosa (A.&S.). R., B.

On old shoe, and on dead wood and bark.

O. leucostigma (Fr.). R.

Also var. *xanthostigma*. B.

On rotting wood.

Calloria Fr.

C. fusarioides (Berk.). R.

On dead stems of nettle.

Coryne Tul.

C. sarcoides (Jacq.). R., B., T.

PHACIDIACEÆ.

Rhytisma Fr.

R. acerinum (Pers.). R., B.

On living leaves of sycamore.

Trochila Fr.

T. ilicis (Fr.) Crouan. R.

On fallen holly leaves.

PHYCOMYCETES.

MUCORACEÆ.

Mucor Mich.

M. mucedo L. R.

Spinellus Van T.

S. fusiger. B.

On decaying *Mycena*.

Pilobolus Tode.

P. crystallinus Tode. R., B.

Common on cow dung.

PERONOSPORACEÆ.

Phytophthora DeBary.

P. infestans DeBary. R.

Peronospora Corda.

P. effusa Rabh. R.

On living leaves of *Chenopodium Bonus-Henricus*.

DEUTEROMYCETES.

NECTRIOIDACEÆ.

Sphæroneumella Karst.

S. fimicola March. R.

On rabbit dung.

HYPHOMYCETEÆ.

Monilia Pers.

M. aurea Genel. R.

Cylindrium Bon.

C. flavo-virens Bon. R., B.

On dead oak and beech leaves.

Penicillium Link.

P. glaucum Link. R., B.

Sepedonium Link.

S. chrysospermum Fr. B.

On decaying *Boletus*.

Torula Pers.

T. herbarum Link. R., B.

Cladosporium Link.

C. herbarum Link. R., B.

Both on dead herbaceous stems.

Helminthosporium Link.

H. Smithii B.&Br. R.

On decaying beech mast.

Brachysporium Sacc.

B. apicale B.&Br. B.

On dead branch.

B. obovatum (Berk.). R.

On decaying beech mast.

Stilbum Tode.*S. tomentosum* Schr. B.On *Trichia*.*S. fimetarium* B. & Br. R., B.

On rabbit dung.

Isaria Pers.*I. farinosa* Fr. B.

On dead chrysalis.

Ægerita Pers.*Æ. candida* Pers. R., B.

On rotting wood and bark.

MYXOMYCETES.**Physarum** Pers.*P. viride* Pers.= *Tilmadoche mutabilis* Rost. R.*P. nutans* Pers. R., B.= *Tilmadoche nutans* Rost.

On rotting wood.

Craterium Trent.*C. confusum* Mass. R.**Chondrioderma** Rost.*C. physarioides* R.**Didymium** Schrad.*D. squamulosum* Fr. R.

Last three on dead leaves.

Stemonites Gled.*S. fusca* Roth. R., B.*S. Friesiana* DeBary. R., B.**Cribraria** Pers.*C. purpurea* Schrad. R.

On decaying fir wood.

Reticularia Bull.*R. lycoperdon.* R.**Trichia** Hall.*T. fragilis* Rost. R., B.*T. varia* Rost. R., B.*T. fallax* Pers. R.**Arcyria** Hill.*A. punicea* Pers. R., B.*A. incarnata* Pers. B.*A. cinerea* Schum. B.**Perichæna** Fr.*P. depressa* Libert. B.*P. corticalis* Rost. R., B.

The preceding nine all on rotten wood.

MYCETOZOA.

Badhamia rubiginosa Rost. var. *globosa* n. var.—This Mycetozoan was described in the 'Journal of Botany' for May 1904 by Mr. and Miss Lister, the variety being then published as new. On 3rd September 1901 I gathered *Sphagnum turfæum* in Arncliffe Wood, N.E. Yorkshire. This was growing with capitula growing downwards and in dense masses on vertical dripping rocks. On closer inspection I found the *Sphagnum* covered, chiefly along the stem, with numerous black dots on tiny stalks. Miss Lister, a specialist on Mycetozoa, has determined this as the new var. *globosa* of *Badhamia rubiginosa*, which she describes as follows:—'Sporangia subglobose, slightly umbilicate below, 0.5 mm. high, 0.7 mm. broad, purplish grey; stalks 0.6 mm. to 1 mm. long, 0.12 mm. thick, dark purple brown.' It was found in a wild ravine near Llan-y-Mawddwy, N. Wales, in 1895, 1898, and in September 1902, also associated with moss and wet rocks, as with my gathering, whereas the normal form grows on leaves or fir-needles under trees. Miss Lister finds the Arncliffe Wood specimen curiously destitute of the lime granules with which the capillitium, wall, and stalk are generally charged.—WM. INGHAM, 15th October 1904.

THE CHEMISTRY OF SOME COMMON PLANTS.

P. Q. KEEGAN, LL.D.,
Patterdale, Westmorland.

Wood Anemone. *Anemone nemerosa*. Of all the lovely flowers of early springtime this one is *par excellence* by reason of its gracefulness and associations. In an open wood nestling near the feet of tall trees, its starry clusters, gracefully pendent or erect in rain or shine, gently wave to the balmy breath of spring. It shrinks from cold and rain, but 'the first moment that the sun may shine bright as the sun itself, 'tis out again.' The plant is acrid and bitter, but not truly poisonous, although it produces diuresis, congestion of the lacteals, and impoverishment of the blood—all which is due to a very volatile, odourless bitter principle called anemonin $C^{10}H^8O^4$ which chemically is an acid anhydride with aldehydic and hetonic groups easily decomposed during the drying of the herb into anemonic acid with destruction of the acrid-narcotic action. The rhizome grows in a horizontal direction, migrates rather quickly in the soil, dies off very late at the hind end, and possesses only thread-like, non-contractile rootlets; it contains 72 per cent. of water and 11.5 cellulose, also much starch and resin, some tannin, and a blackish-brown substance possibly phlobaphene. The above-ground parts of the plant have much carotin and wax, some resin and enemonin, a very little iron-greening tannin or tannoid, some pectosic mucilage, no free phloroglucin, and little sugar, starch, or oxalate of calcium; the ash amounts to 8.85 per cent. in dry and contains 48.2 per cent. soluble salts, 19.5 lime, 8.1 P^2O^5 , 4.3 SO^3 , and 12 chlorine.

Gorse or Whin. *Ulex Europæus*. Who has not marked 'the gay Gorse bushes in their flowering time?' A tenant of wild sandy heaths and siliceous places, it enjoys a vigorous vegetation, needs plenty of bright light, shuns lime, and poverty of soil, phosphates and nitrates, is no obstacle to its propagation and extension. It acquires its nitrogen by fixation from the atmosphere. The starch seems to disappear from the cortex and pith, but not from the wood during the winter. The plant contains about 53 per cent of water, 4.5 albumenoids, 0.9 fat, 14.3 crude cellulose, 1.8 sugars, 8 to 12 pentosans and pectin, and 1.57 ash, which (pure) has 27 per cent. potass, 11.7 lime, 1.6 iron, 6.7 P^2O^5 , and 4.7 SO^3 . There seems to be no alkaloids or toxic glucosides in the flowering bush, but the seeds contain

about 0.2 per cent. of an alkaloid called vulexine (cytisine) $C^{11}H^{14}N^2O$, which in doses of 0.1 gram produces diuresis, and is a nerve and muscle poison especially of the lungs. The gay and brilliant flowers have a little volatile oil, wax, and fat, and much tannoid allied to luteolin or quercitrin; the orange pigment is due to carotin enclosed in homogenous chromoplastids.

Burdock. *Arctium lappa*. This biennial, of some four feet or more in stature frequents specially waste, sequestered, and lonesome places. The last house in a valley rising into mountain solitude, or a lonesome, outlying barn may bear in their precincts a patch of Burdocks entirely isolated, no other specimens occurring perhaps for miles around. Belonging to the great order Compositæ, its chemical characteristics might be, so to speak, anticipated. The root is devoid of starch, but contains inulin, sugar, mucilage, albumenoids, a glucosidal bitter principle, wax, little resin, but more tannin than other parts of the plant, and 3.7 per cent. of ash. The huge lower leaves, grey and downy below, are difficult to tackle, but a few other leaves, from five to twelve inches in length, were analysed and found to contain not much starch or sugar, but a great quantity of resin and mucilage, with some fat oil, 2 to 3 per cent. tannin, a small quantity of an extremely nauseous bitter principle in the form of a resinous glucoside (cuicin), and 13.2 per cent. ash in dry, which had 55.4 per cent. soluble salts, 14.2 lime, 2.5 P^2O^5 , and SO^3 , and 5.8 chlorine. The fruit contains 15.4 per cent. drying oil, 5.5 resins, and a little cuicin. No nitrate reaction was yielded by the petioles of the larger leaves, whose size and vigorous dimensions are connected with the eminent capacity of the comparatively copious parenchyma of the adventive roots for the storage of reserve-substances, which (especially inulin) provide a specially stimulating pabulum of respiratory material incident to rapid and, as it were, tropical outgrowth.

Cuckoo-Pint. *Arum maculatum*. This quaint plant is one of the earliest to awake from winter sleep, as it were, and ere the meadows begin to be reclad with vernal vesture its clumps of pronounced green foliage rise from solitary waste lands by road and field side. The chemistry of this plant has been forced into notice by reason of its quondam extensive employment in pharmacy. It contains in all parts (especially in the corm) a glucoside having all the general properties of saponin, and is a poison similar to but feebler than the sapotoxins in scarcely acting on the heart and not destroying the irritability of nerve and muscle. It contains also another poison, viz., a very volatile brown

liquid, alkaloid with properties the same as the conicine of Fools' Parsley, etc. The root parts consist of a corm which grows horizontally, acts as a storehouse of nutriment, and forms 30 to 40 simple rootlets, the half of which are contractile and draw it down in autumn to about a depth of four inches; the fresh organ contains 58.4 per cent. of water, 0.6 fat-oil, 25 starch, 5.2 fibre, also gum, mucilage, albumen, resin, saponin (which migrates to the leaves and stem in spring), and alkaloid. The dried leaf-blades on 18th May contained 3.4 per cent. wax, carotin, etc., but no glyceride, also an iron-greening phlobaphenic tannin, much resin and glucose, some mucilage, but no starch, and 10.2 ash having 55.8 per cent. soluble salts, 10.1 lime, 3.4 silica, 3.8 SO^3 and 6.8 P^2O^5 , the black spots occur only in the palisade cells, and not in the epidermis. The very attractive yellow and red pigmentary decorations of the floral parts and fruit are due to carotin contained in chromoplasts in amorphous granules encased in a proteic stroma; also a red crystallisable pigment has been extracted.

Garlic. *Allium ursinum.* This eminently graceful plant lurks under the covert of damp woods and shady hedgerows, and exhibits the usual absence of bright attractive colouration incident to a decidedly repulsive odour. The root appanage is a bulb provided with contractile (formed in spring) and conducting (formed in autumn) roots, and contains inulin, but no starch, also mucilage, resin, and a volatile oil (a vinyl derivative) composed of bisulphides of diallyl and allylpropyl, also $\text{C}^6\text{H}^{10}\text{S}^3$ and $\text{C}^6\text{H}^{10}\text{S}^4$, but no oxygen or sesquiterpene; on germination a transformation of cane-sugar into glucose has been observed. The leaves on 2nd June contained 2.3 per cent. of wax with a little carotin, but no fat-oil, also much resin and sugar, some pectosic mucilage and a glucoside which precipitates bromine water, but no tannin or starch, and no extractable proteid; the ash amounted to 9.4 per cent. in dry, and had 69.6 per cent. soluble salts, 11.7 lime, 4.5 P^2O^5 , 6 SO^3 , and 21.5 chlorine. It may be observed that the genus *Allium* represents among vegetables an extreme case of the non-production of starch, although the bulb and roots are not very eminent as reserve-holders. In fact, the enormous quantity of chlorine in the ash is inimical to such production, but whether its presence is a cause or an effect is a question difficult to tackle or decide.

Mushroom. *Agaricus campestris.* As is well known, the vegetable portion of this plant is hidden in the ground, the

reproductive portion appearing above the soil in the shape of stipes, pileus, and gills. In the fresh state the latter portion contains 90 per cent. of water, 0.25 fat (olein, etc.), 5.9 nitrogenous matters, 2.9 carbohydrates, etc., 0.84 fibre, and 0.75 ash, which has 20.2 per cent. potass, 7.5 sand, 25.2 P_2O_5 , etc.; in some soils there is in the ash 46.8 per cent. potass, 34.5 soda, 2.4 lime, 8.2 P_2O_5 , and 4.9 SO_3 . A nucleo-proteid figures largely in the nitrogenous matters, also 0.32 per cent. lecithin, leucine, tyrosin, and a soluble ferment (possibly trelelase). When young the fungus contains a di-hexon sugar called trelalose, but when older, or after gathering, mannite also appears, or the latter alone when the conditions of spontaneous fermentation are specially favourable. The usual products of plant deassimilation are rare in fungi; they do not produce starch, lignin, ordinary cellulose, chlorophyll, tannin, or resin. After successive extraction by dilute soda, boiling dilute acid, alcohol, and ether, a translucent, horny, whitish residue is left of chitosan, yielding chitin (same as in animals). The large amount of nitrogen is probably derived from the air confined in the soil, the heavy drain of potass represents a very energetic phenomenon of oxidation, and decomposition products of the proteids are responsible for the various colouring matters; for instance, the pink colour of the gills turning to brownish black at the maturity of this Mushroom is probably due to tyrosine acted on by an oxidising ferment.



HYMENOPTERA.

Lincolnshire Galls.—At a meeting of the Lincolnshire Naturalists' Union at Spilsby, on 28th July, the following galled plants were noted:—On Spilsby Sandstone: *Ranunculus repens*, by *Polycystis pompholygodes*; *Galium Aparine*, by *Eriophyes galii*; *Quercus pedunculata*, by *Neuroterus numismatis*; *Juglans regia*, by *Eriophyes tristratus* var. *erinea*; *Veronica Chamædrys*, by *Cecidomyia veronica*; *Urtica dioica*, by *Cecidomyia urticae*; *Atriplex angustifolia*, by *Aphis atriplicis*; *Spiræa Ulmaria*, by *Cecidomyia ulmariae*; *Cratægus monogyna*, by *Cecidomyia cratægi*. On Boulder Clay: *Galium Aparine*, by *Cecidomyia aparinæ*; *Rosa canina*, by *Rhodites rosæ*, and by *R. nervosus*. On Kimmeridge Clay: *Fraxinus excelsior*, by *Phyllocoptes fraxini*; *Salix fragilis*, by *Nematus gallicola*.—S. C. STOW, Grantham, 29th August 1904.

FIELD NOTES.

BIRDS.

Honey Buzzard in Lincolnshire.—A Honey Buzzard was shot at Fishtoft, near Boston, on 27th September 1904 by Mr. A. Grant. It is being stuffed by Mr. Freeman, taxidermist, of Boston. The shooter fired at such close quarters that the bird's head was almost too shattered to stuff.—J. CONWAY WALTERS, Langton Rectory, Horncastle.

MOLLUSCS.

***Helix lapicida* var. *albina*.**—On the 28th June last I found at Cailby, on the Great Oolitic Limestone, the above variety of *Helix lapicida*, which I am told is a record for the county.—THOMAS STOW, Grantham.

South Lincolnshire Mollusca.—Mr. T. Stow (Grantham) has shown me *Helix nemoralis arenicola* 12345, 1(23)(45), and 023(45) from Sapperton, 10th August 1904. Also *H. nemoralis tenuis* from Spilsby, 4th August 1904, *H. lapicida albina*, Carlby, 28th June 1904.—E. A. WOODRUFFE-PEACOCK, Cadney, Brigg.

LEPIDOPTERA.

Hummingbird Hawkmoth at Ripon.—On 8th August I saw a beautiful specimen of this insect in my garden on the banks of the Skell. It was hovering over the flowers in bright sunshine for more than an hour.—HORACE ST. PAUL, Ripon, 10th September 1904.

ORTHOPTERA.

***Panchlora exoleta* Klug. in West Yorkshire.**—I have recently determined the pretty green Cockroach brought to me by Mr. J. W. Carter from Bradford at the beginning of this year (see 'The Naturalist,' March 1904, p. 94). It is *Panchlora exoleta*, and according to Brunner is a native of Brazil, Jamaica, Venezuela, Vera Cruz, and Surinam. Mr. Fred Lawton has just recently captured another specimen at Skelmanthorpe 'flying about in the road.' Dr. Eland Shaw had recorded two specimens prior to Mr. Carter's capture, one in Leicestershire, the other in Scotland, and these four are, so far as I know, all that have yet been recorded in Britain. They have, of course,

been accidentally introduced into this country, very probably, I think, with Jamaica bananas, which during the past several years have been sent here in such large quantities.—GEO. T. PORRITT, Huddersfield, 11th October 1904.

Rare Insects at Doncaster.—During the last few days I have had brought to me three insects pertaining to three orders, and all of sufficient rarity in Yorkshire to be worthy of record. They are—Coleoptera, *Monohammus sutor*; Lepidoptera, *Zeuzera æseuli*; and Hymenoptera, *Sirex juvencus*. All were captured within the borough of Doncaster.—H. H. CORBETT, Doncaster, 22nd July 1904.

FLOWERING PLANTS AND FERNS.

***Alopecurus fulvus* in South Lincs.**—While botanizing at Denton Reservoir (Div. 15), on 30th August, we had the good fortune to take *Alopecurus fulvus* Sm. (*A. æqualis* Sobol.) in the ditch which feeds the reservoir; river gravel. This is a first record for S. Lincs. 53. It has been recorded once for N. Lincs. 54—Isle of Axholme, Div. 1.—S. C. STOW, Grantham, 10th September 1904.

***Malaxis paludosa* Sw. in Westmorland.**—This interesting and rare orchidaceous plant was found in fair quantity on 1st August, close to the mountain road between Little Langdale and Blea Tarn. The habitat was a stony 'syke' amongst gelatinous fresh-water algæ—and not sphagnum as is usually stated. This appears to be a new locality for the plant in the Lake District.—J. FRASER ROBINSON, Hull, 20th August 1904.

***Lastræa Thelypteris* Presl. in East Yorkshire.**—On an excursion of the Hull Scientific and Field Naturalists' Club in the neighbourhood of Driffeld on the 13th August, the Rev. F. H. Wood, B.D., rector of Bainton, pointed out a new locality in East Yorkshire for the Marsh Buckler Fern. This fast-disappearing fern occurred in profusion in a boggy situation near Kelleythorpe. This is the second station where the plant still grows in East Yorkshire.—J. FRASER ROBINSON, Hull, 20th August 1904.

North Lincolnshire Botany.—At the L.N.U. meeting at Spilsby, 28th July, over 200 species and varieties of plants were noted. The following are the best. On Spilsby Sandstone:—*Potentilla argentea*, *Salvia verbenaca*, *Ballota nigra* var. *flore albo*, *Poa compressa*, *Asplenium* *Adiantum-nigrum*, *A. Trichomanes*, *Chenopodium album* var. *viridescens*. On Boulder

Naturalist,

Clay :—*Paris quadrifolia*, *Pimpinella Saxifraga* var. *dissecta*, *flore roseo*, *Sanicula europæa*, *Calamintha clinopodium*. On Kimeridge Clay :—*Silene cucubalus* var. *puberula*.—S. C. STOW, Grantham, 10th September 1904.

***Sonchus palustris* in North Lincolnshire.**—Mr. Arthur Bennett writes to me he has a Lincolnshire specimen of *Sonchus palustris* lying before him. There is no doubt it is the true plant. It is in the Herbarium of the Dublin Museum of Science and Art. The label is as follows :—‘Lord de Tabley’s Coll., *Sonchus palustris*, Fens, Lincolnshire, A. Bloxam.’ No doubt this is one of the East Fen specimens. Bloxam was a young friend of Sir Joseph Banks. Most unluckily H. C. Watson muddled the Banks-Young list, and in the ‘Topographical Botany’ put the species down for S. Lincs. 53 instead of in N. Lincs. 54, which was their proper place. The East Fen being north of Boston, all the species in that list are in the wrong vice-county, *Senecio palustris* and *S. paludosus* for instance.—E. ADRIAN WOODRUFFE PEACOCK.

Lincolnshire Plant Notes.—*Antennaria dioica* R.Br. is very rare in the eastern counties south of the Humber. I received it from Misses Skrine and Erskine, taken in Barnach old quarries on the 24th June. *Scirpus Caricis* Retz. is very rare in Lincolnshire. It was also taken by the lake near Holywell Hall, S. Lincs. 53, on 24th June, by the Rev. W. W. Mason and Miss Stow. *Trifolium ochroleucon* Huds. according to my notes is commoner in Hulland than in the neighbouring counties. I have received it from Miss Trollope from Empingham parish and from the wood side between Great Castleton and Folethorpe. It seems to have disappeared from its old Pickworth locality. In Lincolnshire N. and S. it is peculiar, as recorded, to Chalky Boulder Clay. It is very rare with us. I have only four certain localities, and have never taken it personally. *Bromus mollis* var. *ovalis* Parnell. This variety is not in the 9th ed. of the ‘London Catalogue,’ but is in the 8th ed. of Babington’s ‘Manual.’ It has been sent to me from Riseby Manor, Market Rasen, from a Middle Chalk, Sanfoin (*Onobrychis viciæfolia*) field, of two years’ growth. Last season it was not noticed. This year it is in ‘large quantity.’ No doubt the seeds were imported along with the Sanfoin, and its small growth was unremarkable in 1903. But the winds and wet of last winter dispersed it widely, and gave it a fair chance in the struggle for existence.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 1st July 1904.

REVIEWS AND BOOK NOTICES.

Trees: A Handbook of Forest-botany for the Woodlands and the Laboratory. By H. Marshall Ward, Sc.D., F.R.S. Vol. I. **Buds and Twigs.** Pages xi. + 271, illustrated. 4s. 6d. net. University Press, Cambridge.

This is the latest addition to the excellent Cambridge Natural Science Manuals, and is the first of a projected series of volumes to provide students of forest botany with a guide to the study of trees and shrubs from the point of view of the outdoor naturalist. Succeeding parts will deal with leaves, inflorescences, flowers, fruits, seeds and seedlings, and the habit and conformation of the tree as a whole. If this scheme is carried through in the detailed manner of the present volume we are likely to be in possession of a work on British trees and shrubs hitherto quite unequalled. The method of treatment is similar to that adopted by the author in his work on Grasses, and consists of two parts, General and Special. In the first part Prof. Marshall Ward has brought together an immense number of facts relating to buds and twigs not only of British trees but of many of the more generally cultivated exotic species. The book will serve as an excellent guide to all who wish to become familiar with the winter aspect of these plants, and thus fills a gap in our literature. Naturalists, teachers, and students are too apt to neglect plants at this season, which is often regarded as dead and devoid of interest. Prof. Ward shows in this volume how much may be done. The chapter on the Epidermis (pp. 81-93) strikes us as somewhat out of place. In these thirteen pages references to trees are very scanty indeed, and nothing is said about the many interesting epidermal outgrowths and devices to be met with on several common species. We presume, however, these will be dealt with in the next volume on Leaves, but why devote so much space to hairs, etc., on the leaves of herbaceous plants in a work on Trees? The only excuse seems to be the four excellent blocks from 'Kerner,' around which the chapter has been written.

Part II. deals with the classification of trees and shrubs according to characters afforded by their buds and twigs. The value of this section is greatly enhanced by the very numerous illustrations specially drawn by Miss Dawson. These are very characteristic and will be a great help in the identification of specimens. Throughout, the book is well illustrated, and will be invaluable to all interested in trees and shrubs.

◆◆◆

The Lepidoptera of the British Islands. Vol. IX. C. G. Barrett, F.E.S.

We have received Vol. IX. of this gigantic work, which comprises the concluding portion of the Geometrina, the whole of the Pyralidina, the Pterophorina, and part of the Crambina. The first-mentioned group includes the genera *Mesotype*, *Eubolia*, *Collix*, *Eupithecia*, *Tanagra*, and *Aplasta*. Little more need be said than that the volume maintains the high standard of its predecessors; and the histories of the species, especially in the large genus *Eupithecia*, and the smaller but, to a beginner, equally puzzling genus *Scoparia*, together with the monograph on the Pterophorina, will be most acceptable and valuable to students of these groups. Taken as a whole, too, the plates are very good, though here and there, as is almost inevitable among so many figures, one notices one to which exception may justly be taken. It is a pity that in the superior edition a direct reference to the plates is not given in the text; but as the other edition does not contain plates, that would have entailed two separate printings, which no doubt has been the difficulty in its application. We may mention that the volume contains, on Plate 424, a figure of the specimen of *Xylophasia zollikoferi* taken by Mr. Ashton Lofthouse at Middlesbrough last year (see 'The Naturalist,' 1903, p. 456).—G. T. P.

Scottish Reminiscences. By **Sir Archibald Geikie.** James Maclehose & Sons, Glasgow.

To those who are acquainted with Sir Archibald's Text Book of Geology it will seem hardly credible that the author of so technical a work should be able to produce so entertaining and interesting a volume as the latest product of his pen—his 'Scottish Reminiscences.' In this he gives a record of what he has seen and heard during the sixty years he has sojourned amongst all classes in Scotland. He has watched the disappearance of old and the uprise of new usages, and has ever been on the look-out for illustrations of native humour. These latter go a long way towards making the book so 'readable.' Within the 450 pages are collected together a series of Scottish 'yarns' which cannot fail to delight all who read it. True, a good many have been previously heard by the reviewer, but his frequent association with geologists and particularly *Yorkshire* geologists, doubtless results in his hearing more stories of this character than does the average reader. We can strongly recommend the book, not to geologists only, but to any desiring to spend a pleasant and profitable afternoon.

Handbook to the Natural History of Cambridgeshire. Edited by **J. E. Marr** and **A. E. Shipley.** Cambridge University Press. 4s. net.

Within the 260 pages of this volume are to be found articles on Physiography, Geology, Vertebrate Palæontology, Zoology (16 sections), Flora, Archæology, etc.; and these are largely by the leading authorities on the respective subjects. Mr. W. G. Fearnside, a young but able worker, is largely responsible for the geology, etc. Mr. Lydekker's article on palæontology was written for the 'County History of Cambridge,' and here appears, by permission, in advance. There is an excellent coloured botanical map of the district, and in a pocket at the end a geological map, prepared by Mr. H. H. Thomas. The book has been very carefully compiled, and the editors are to be congratulated on producing a work which for some time to come will be indispensable to those desiring information on the natural history of Cambridgeshire. The British Association, for which presumably the volume was prepared, reaped the first benefit of this handbook.

Messrs. Macmillan & Co. have issued a volume of 'Essays and Addresses, 1900-1903,' by the Right Hon. Lord Avebury (296 pp.). In this are bound together in handy form fifteen addresses on various subjects, which those who appreciate the work of Lord Avebury (and who does not?) will be glad to possess. The addresses of particular interest to our readers are 'Huxley's Life and Work,' 'John Ruskin,' 'Richard Jeffries,' 'On Education,' and 'The Study of Nature.' The first of these was the 'Huxley Memorial Lecture' delivered to the Anthropological Institute in 1900. This contains many references to Huxley's career such as only a life-long friend and fellow worker could give. The address delivered at the unveiling of the Richard Jeffries memorial is also most readable, though dealing with a man of a very different type from Huxley. Other essays on 'Our Fiscal Policy,' 'Municipal Trading,' etc., hardly come within the scope of this journal.

'Who's Who,' 1904. 'Who's Who Year Book,' 1904. 'The Englishwoman's Year Book,' 1904. A. & C. Black. We know of few books more useful on the library table than these three. They have been compiled with a care and exactness that is extraordinary. The first may now be looked upon as necessary as a dictionary, and each year is brought up to date. The 'Year Book' contains statistics, lists of secretaries of societies, Government officials, etc.

NORTHERN NEWS.

Mr. G. A. Dunlop has been appointed assistant at the Keighley Museum.

Mr. C. Crossland gives an interesting Ant and Caterpillar story in 'Nature Notes' for October.

Mr. Arthur Smith has a short note on the Botany of a piece of waste ground in 'Nature Study' for October.

Mr. H. Slater (Helmsley) has an article on 'Edible Fungi' in the 'Journal of Agriculture and Cottage Gardener' for 15th September.

An excellent portrait of Sir Joseph Dalton Hooker appears in the 'Transactions of the Natural History Society of Glasgow,' Vol. 6, Pt. 3.

Mr. George Massee, F.L.S., has an article on 'The Influence of Fungi or Birds on Other Forms of Life' in 'Knowledge and Scientific News' for October.

At a recent meeting of the Darlington and Teesdale Naturalists' Field Club a presentation was made to Mr. George Best in recognition of his thirteen years' services as secretary.

A photograph of a group of the Museum Curators assembled at the Norwich Conference appears as frontispiece to the August 'Museums Journal.' Several north country museums are represented.

In the 'Records of the Australian Museum' (Vol. 5, No. 4, 1904) Mr. Edgar R. Waite has some 'New Records or Recurrences of Rare Fishes from Eastern Australia, No. 3,' which is illustrated by plates.

Mr. G. T. Porritt contributes 'Odonata, etc., in the Norfolk Broads' to the October 'Entomologist.' In the same journal a capture of *Lygris (Cidaria) reticulata* is recorded as captured near Lake Windermere on July 30th.

An admirable portrait of Mr. Wilfred H. Hudleston appears in the September 'Geological Magazine,' prefacing an article dealing with his work. Hudleston is well known to Yorkshiremen by reason of his excellent work amongst the Oolitic rocks of the county.

'Migration of Birds in North-east Lincolnshire in the autumn of 1903' is the title of a paper by G. H. Caton Haigh in the August 'Zoologist.' In the same journal is a note on a hitherto unrecorded specimen of a Kite, killed at Millington, Cheshire, in 'the forties'; and a Night-Heron, shot at Newton-le-Willows, Lancashire, some 'ten or twelve years ago.'

Mr. A. J. Jukes-Browne discusses some important questions in nomenclature in the October 'Journal of Conchology.' In the same periodical Mr. W. Denison Roebuck has a note on 'The Re-establishment of *Limax tenellus* as a British Species,' as described in our last number. Mr. Roebuck also has a paper on the same subject in the 'Annals of Scottish Natural History' for October.

We regret to record the death of Mr. John W. Carter, of Bradford. Mr. Carter was a native of Huddersfield, was one of the founders of the Bradford Naturalists' Society in 1875, and was its first president. He was for many years a member of the Yorkshire Naturalists' Union, and frequently contributed to this journal. His death occurred somewhat suddenly, in his seventy-sixth year.

We are pleased to note that through the generosity of the Hon. Mrs. Carpenter, of Kiplin, Northallerton (sister of Lord Walsingham, a former president of the Yorkshire Naturalists' Union), the Museum of the Technical College, Huddersfield, has recently been enriched by the collection of British Lepidoptera formed by that lady. With the collection, Mrs. Carpenter very kindly presented to the College a considerable number of her entomological books.



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PUBLICATIONS RECEIVED.

Entomologist, Irish Naturalist, Knowledge and Scientific News, La Feuille des Jeunes Naturalistes, for November; New Phytologist, October; Part I. Bulletin de la Société de Sciences Naturelles de la Haute-Marne; Bucher-verzeichnis, No. 451, Berlin; Journal Manchester Geographical Soc., Vol. 19, Nos. 7-12, 1904; Naturæ Novitates, 1904, Nos. 14-18; Practical Medicine (Delhi), August; Ornithologisches Jahrbuch, November; Revue Bryologique, No. 6, 1904; Zoologist, Nautilus, Lincolnshire Notes and Queries, Bradford Scientific Journal, and Le Mois Scientifique, for October; Nautilus, Zoologist, and Nature Notes, for November; Hull Museum Publications, No. 20 (10th Quarterly list of additions), University of Kansas Bulletin, June 1904.

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NOTES AND COMMENTS.

THE BIRDS OF FLAMBOROUGH HEAD.

All naturalists will be delighted to learn that at a recent meeting of the East Riding County Council it was decided to make application to the Home Secretary, under the Wild Birds' Protection Acts, 1880-1896, for an order 'prohibiting during the whole year the shooting or killing, or attempting to shoot or kill sea birds on or from the piers of Bridlington, or within the harbour of Bridlington, or on or from the sands or sea-shore, *or any part of the sea* within an imaginary line drawn from the South Landing in the parish of Flamborough, to the outlet of Barmston Drain, which is situated about six miles to the south of Bridlington. Such an order has been required for a long time, and it is sincerely to be hoped that it will be put into force and *acted upon*. In many cases, as we have frequently pointed out, the so-called 'protection' of birds has proved to be a farce—rare birds being regularly shot, and particulars thereof, with the name of the 'sportsman,' etc., appearing in the press and in the natural history magazines as a matter of course. Commenting on the recent recommendation of the East Riding County Council, one of the local newspapers states that it will 'bring dismay to the large number of sea-bird shooters who at this time of the year frequent the shores of Bridlington at all times of the day.' Let us hope it may. Judging from past experience, however, we are almost inclined to think that the matter will make but little difference—the principal result probably being a certain expenditure in printing and posting bills with the new order thereon. We hope we are wrong.

THE REV. HENRY JOHN TORRE.

On February 2nd last there passed away at Norton Curlieu, near Warwick, the Rev. Henry John Torre, M.A., clergyman, gentleman, all-round sportsman, and naturalist. He was the eldest son of the Rev. Henry Torre, rector of Thornhill, near Dewsbury, Yorkshire, and was born at Doncaster, 25th February 1819, and, as he tells us in his interesting 'Recollections of School Days at Harrow more than Fifty Years ago,' published in 1890, he entered that school after Easter in the year 1831, and remained there until 1838. He subsequently proceeded to Oxford, and he played in the University Eleven against Cambridge in 1840, and he rowed in the University College boat in 1840 and 1841, in which years it was head of the river. He took his B.A. degree in 1840. He was ordained

in 1842, and became curate of Burton, Salop. Soon afterwards he was appointed domestic chaplain and private secretary to Lord Falkland, Governor of Nova Scotia, a post which he appears to have held for three years, and, in 1848, he was *locum tenens* to the Chaplain of the Forces at Corfu. Having visited Cuba and Bermuda, and travelled all over Europe, in 1852 he took up his abode at Stankhill, Budbrooke, in Warwickshire, and, in 1857, he settled at Norton Curlieu. He was incumbent of Wroxall from 1861 to 1881, but continued to reside at Norton Curlieu.

Natural history was one of the greatest sources of interest in life to Mr. Torre. He was an ardent ornithologist from his earliest years. His father's rectory was within a few miles of Walton Hall, the residence of Charles Waterton, and to him and his writings Mr. Torre attributed his earliest taste for ornithology. He had an extensive knowledge of the habits of birds, resulting from long practical experience. When at Harrow, Mr. Torre made a collection of local birds' eggs, which, a few years ago, the writer had the privilege of inspecting, when they were in a remarkably good state of preservation and colour. He also compiled a bare list of the birds observed in that neighbourhood between the years 1831 and 1838, published under the more ambitious title of 'List of the Birds of Middlesex'; the list contains the names of 114 species, and appeared in 'The Naturalist' in 1838. At Harrow he learnt the art of taxidermy from Goshawk, the school tonsor. During the three years he passed in Nova Scotia, he made a collection of several thousand skins of birds, all which were shot and preserved by himself.

Mr. Torre enlarged and improved the house at Norton Curlieu, and laid out the grounds, planting all the trees and shrubs himself. No one was allowed to destroy, or interfere with, any birds on his estate, and, in the grounds he fixed up a model of a church and other conveniences of all shapes and sizes for the birds to build in.

Of commanding presence and robust health, Mr. Torre maintained his physical and mental faculties marvellously unimpaired to the last, and exercised a lively interest in the topics of the day and his favourite pursuits up to the time when nature claimed her own. His only published paper is the list of birds observed at Harrow, but from his notes and recollections, he gave material assistance to Mr. (now Captain) G. E. H. Barrett-Hamilton in the compilation of 'Harrow Birds,' published in 1892.

Mr. Torre presented his library of natural history and sporting works to the Yorkshire Club at York a few years ago.

W. B. ARUNDEL.

Naturalist.

THE EFFECT OF THE STORMS OF 1903 ON BIRD LIFE DURING 1903-4.

KENNETH McLEAN,
Harrogate.

THERE is an old saying that a west wind goes to bed at night, and I have frequently noticed this to be true, but at the commencement of 1903 the wind behaved in a most unprecedented manner, upsetting all proverbs and beating all records. When we retired for the night it was blowing and roaring, and when we got up it was roaring and blowing. And this continued with scarcely any intermission for at least three months. It was interesting to note how these prevailing tearing west winds affected bird life. It caused the Rooks a lot of extra labour. Their nests in many cases were completely blown away and they had to find fresh material and fresh places; it was not a matter of rearrangement but rebuilding with them. In their choice of fresh places the bulk of those which had to rebuild selected much lower positions; but, alas, even then the earlier birds had their nests again blown out, and a great many eggs were thrown out of the nests to the ground by the swaying of the trees. My observations extended to something over half-a-dozen rookeries in the neighbourhood of Harrogate.

Even Magpies' nests, 'those wonderful structures so twined and intertwined into the branches of the tree tops that they had resisted the storms of many years,' were scattered by the raging winds. I noticed, however, in several cases trees containing the nests of these birds were uprooted and blown down, but the nests remained whole. So cleverly had they been interwoven, the sweeping blast and crash of the falling tree had affected them but little, a fact which clearly proved the skill of the builders.

I never before saw so many Blackbirds', Thrushes' and Hedge Sparrows' nests at the very bottom of the hedges and on the ground. Never a season passes without my seeing a fair number of these nests so placed, but during my rambles in the early spring of 1903 I found fully four out of five had chosen such lowly positions. One Blackbird had evidently postponed building too long, and in her hurry had scruffled herself a hollow on the bank side and there laid her four eggs upon which I found her sitting; there was no sign of a nest in her case.

I can almost fancy some discussion took place betwixt many of these male and female members of the Aves family as to

whether they should risk having their nests blown out with the wind or take the chance of getting their eggs sucked or young ones eaten by Rats, Weasels, etc.

The Missel Thrush, too, one of our earliest breeders, built in unusually low positions ; one I saw within two feet of the ground, another hanging over a small stream not more than 2 feet 6 inches above its surface. In a long plantation of Firs, with here and there a stunted Oak, Ash, or Elm, I have found a number of Missel Thrushes' nests every year; running along the west side of this strip of trees there is a wall from 3 to 4 feet in height. In 1903 I found all the nests below the level of this wall top and so sheltered from the west winds. In previous years and this year (1904) they ranged from 6 to 10 feet above the surface of the ground.

Another thing I noticed, these early builders in very many cases wisely chose the east side of some shelter, for instance, nearly all which built upon the ground made their nests on the east side of some bank, and numbers which built in the hedges had their nests sheltered by some object such as post or rail, and one pair of Thrushes found a very snug corner behind a pair of old trousers which had been thrown on the hedge. A greater number than usual also took the advantage afforded by old sheds and outbuildings. In one tumble-down old place I found the nests of two Blackbirds, one Thrush, and one Robin within a few yards of each other.

Many more instances might be mentioned of birds of several kinds making use of different objects as shelters for their nests during the strong west winds of the early part of the Spring of 1903.

To say the least of it the wind made it very uncomfortable for the early breeders ; but worse was to follow. The wind towards the end of April was certainly more subdued, but the pattering showers of February and March became persistent pour-downs as the year advanced, and the later breeding birds had to nest under far more deplorable conditions.

The end of April scores of birds had their nests destroyed by the heavy falls of rain. May was even worse ; hundreds of Sand Martins, Wagtails, Waterhens, Kingfishers, and others breeding near the streams had nests, eggs, and young swept away with the overflowing waters. We must all remember how—

The dykes o'er filled and with a roaring sound
The rising rivers float the nether ground.

One pair of Kingfishers, which I had known to build in a certain hole for three years running, had to find a hole higher up the bank ; whether they were washed out of their original nesting-place, or chose the higher position with instinctive foresight, I cannot say. Sand Martins, too, made fresh holes ; one so near the surface that my foot went through as I walked over it, and many within six inches of the top.

Many Water Hens built in trees overhanging the streams ; two or three I found fully twelve feet above the water, and many some distance away from the stream side. One I noticed built among some rushes about eighteen inches above ordinary high-water mark, was raised no less than three times in a week, and would be quite two feet nine inches above the surface of the water during an ordinary flood ; but even then nest and eggs were swept away. Such labour and care deserved a better fate.

A most pitiful case came under my notice on the 15th of May. As I was walking by the side of the river Nidd, which was very high, in many cases sweeping over its banks, I saw something floating down on the surface of the water. As it got nearer I saw it was a Wagtail's nest, evidently just dislodged from some ledge by the river-side. I could see one or two naked young ones in it, and flying backwards and forwards in a state of great agitation and distress was one of the old Wagtails. Just below the stream swept with great force over a rocky bed, and no doubt the poor little sailors there found a watery grave. I know many suffered a like fate.

A pair of Great Tits had their nest in a hole in some projecting tree roots, and there I found six newly-hatched birds completely covered with water. The same hole had been used for several years, and the young had got safely away.

Another rather remarkable case was a Blackbird's nest built in the hollow formed by the fork of three branches, and the eggs, four in number, were completely immersed in water. Several Thrushes' nests I also found forsaken, and the mud-lined nests containing water sufficient to cover the eggs. Large numbers of those birds building on the ground, such as Skylarks, Meadow Pipits, Tree Pipits, Willow Wrens, Chiffchaffs, had their nests, eggs, and young destroyed by the incessant rain-storms.

Pheasant, Partridge, and Grouse also suffered severely ; and those which were hatched were not free from the ill effects of the wet, for many hundreds died from gapes resulting from being continually wet and cold.

So much, then, for the disastrous season of 1903. As might be expected, we found many kinds of birds much reduced in numbers this year. From my own observation and that of several other ornithologists, I am convinced that no more than half the usual number of summer immigrants visited our shores. The Cuckoo's note was not so frequently heard; the Landrail's crake was wanting in many meadows where it seldom missed being heard in previous years; the Willow Wren was not half so numerous as usual; the Chiffchaff I do not remember being so scarce; the Tree Pipits and Wagtails were nothing like so common; whilst many of our residents were greatly reduced in numbers.

Another result which I think is traceable to the wet season of 1903 we found in the poor broods of this year. Those birds which were hatched and reared in 1903 were, many of them, constitutionally weak in consequence of the wet, cold season. And so I have found the nests of several birds containing half or less than half the usual number of eggs and young. A Willow Wren sat upon three eggs and hatched only two; another upon four eggs and hatched only one; two of the other eggs contained chicks too weak to get through the shell. A Yellow Hammer sat upon three eggs, hatching two, one of which died soon after hatching. Several Thrushes I found sitting on two and three eggs, and one Blackbird with one young one, which turned out to be pied in colour and is still alive; I saw it on 13th October 1904. Another Blackbird had two young ones out of five eggs, three eggs being unfertile.

A pair of Grey Wagtails built in an old barn; four eggs were deposited in the nest and sat upon the full fourteen days, and then were forsaken. About a week after I broke the eggs, and found they were all unfertile. The first time I ever knew a wild bird sit the full time with a like result.

I could say much more, but I think I have said enough to prove, first, that many birds were much reduced in numbers, and, secondly, that many were weaker and less fitted for their domestic duties than usual, and that these results could be directly traced to the unfavourable weather during the spring and summer of 1903.

Limnæa stagnalis v. umbelicus at Leeds.—On 25th October, in a pond near Hunslet, Leeds, I found a large number of *Limnæa stagnalis* with the mouth of shell very much elongated and a distinct *umbelicus*. The *umbelicus* in some of the larger specimens were from $\frac{3}{16}$ to $\frac{1}{4}$ inch deep.—W. HARRISON HUTTON, Leeds.

FUNGUS FLORA OF A CAST-OUT HEARTH Rug.*

C. CROSSLAND AND J. NEEDHAM.

In early February 1897 a cottage hearthrug, which had evidently become too threadbare for further service, was noticed in a corner of Pecket Wood, where it had been thrown by its owners as a ready means of getting rid of it; possibly it had been cleared out the previous Christmas to make room for a new one. Pecket—or, as marked in the 6-in. Ord. Map, Spring—Wood is one of the many woodlands in the vicinity of Hebden Bridge. The rug was home-made, and consisted of cloth tabs fixed into a coarse, sacklike framework, backed by a piece of closely-woven jute sheeting. In size it was 6 ft. by 3 ft. The materials entering into its composition were wool, cotton, and jute. Having seen fungi of various kinds, particularly *Ascophanus carneus*, growing on rotting woven materials in woods, under hedges, etc., we decided to give this old rug a chance to foster any fungus spores that might happen to find their way to it as it passed through its various stages of decay. With this purpose in view the rug was moved to a more suitable place in the wood for seclusion, dampness, and shade, and so laid that both sacking and cloth tabs would have equal chance. There were then no signs of fungi of any kind upon it. It was kept under observation by weekly or fortnightly visits (except in midwinter) so long as any of it remained undecomposed.

The first observable fungus was noted on the 3rd of April, a small black Pyrenomycete. There were numerous perithecia on the damper portion of the cloth tabs; a few were taken for examination, but being immature a further examination of others was made a fortnight later. It proved to be *Anixia spadicea* Fekl., a somewhat uncommon species. This was the first time we had met with it; its confrere, *A. cyclophora*, had been previously found on rotting paper at the bottom of a railway embankment in another part of the district.

On the 6th of May a little stemless resupinate Agaric, *Pleurotus septicus* Fr., had developed on the jute sacking. This is a common species, and commands a wide range in variety of habitat. It has been found on fallen trunks, twigs, leaves, decaying fungi, dung, etc., and now we can add, rotting jute fibre.

* Read at the Rokeby Fungus Foray.

On 17th May *Libertella fusispora* Mass. and Crossl., a member of the group Melanconiaceæ, appeared in the shape of very delicate tendrils of agglutinated fusiform conidia oozing from among the threads of the cloth. This was submitted direct to Mr. Massee, who found it to be a new species. We have not seen it anywhere else.

On 19th June the ascophores of the one we expected to be first on the scene made their appearance, viz., *Ascophanus carneus* (Pers.). When it did appear it occurred abundantly on both cloth and sacking, and continued to produce its fruits until the middle of August. It reappeared in July and August the year following. This one also has a wide range in habitat; it occurs on horse, cow, and rabbit dung, leather, rotting paper, rope, cloth, hemp, cotton, etc.

On the same date a peculiar grey mould, *Bolacotricha grisea* B. & Br., was observed. It consists of little heaps or cushions of conidia (or may be asci) with granular contents, the cushions being sparingly studded with brown, thickcoated, sterile hyphæ with curved tips. There was more of it the following year. We had previously found this fungus on a bit of old carpet in Elland Hall Wood some eight or nine miles away.

At the same time *Perisporium vulgare* Corda, a second member of the minor group Perisporiaceæ, was collected on the more decayed portions of both the cloth and jute. This was found the same season on rotten sacking in another part of the parish. Still another of this group, *Perisporium funiculatum* Preuss., developed a little later on the jute portion.

Towards the end of June a Discomycete known on the Continent as *Humaria deerata* Sacc. = *Peziza deerata* Karst. came forward on the jute; it flourished in abundance throughout July, and reappeared sparingly in July the year following. This species was new to Britain, but was on record in Germany and other continental countries as growing on decaying herbaceous stems. It was figured and described in 'The Naturalist,' January 1899, pp. 28 and 31, figs. 1-8. We have not met with it in any other place.

About the same time a third Discomycete—*Peziza linteicola* (Phil. & Plow.)—appeared; it occurred abundantly on the jute, continued till August, reappeared in July the following year, and held on so long as a bit of the rug was left. We saw this in the same wood in August 1894, on scraps of old sacking. It was first found at King's Lynn on damp, rotting linen cloth, hence its name *linteicola*. The same thing has been found by Mr.

Gibbs on old sacking near Hathersage, Derbyshire. So far, it is not known to have occurred upon anything but manufactured vegetable fibre.

In July the peculiar *Onygena pilogena* Fr., which selects old flannel, cast-out worsted stockings, etc., began to show itself and developed many mature peridia. This grew on the cloth-tabs exclusively, and speaks well for the quality of the cloth, pronouncing it to be plus wool minus cotton; the family *Onygena* being addicted to animal substances only. The jute remained quite free. This species was found in Pecket Wood on an old felt hat the same year and again in April 1898. It also reappeared in July 1898 on the then far-gone cloth-tabs. The only other place in our parish where we have seen it was on an old worsted stocking on rubbish heap, Barkisland, nine or ten miles away.

A fourth Discomycete—*Orbilbia vinosa* (A.&S.)—came next. It flourished equally well on all parts of the decaying rug. Like a few of the others it exhibits a varied choice in habitat, and has been seen to flourish on decaying wood, bark, old rope, leather; now we can add cloth. On whatever it grows its production of ascophores is very profuse.

This concluded the first year's crop.

In July 1898 a bright red mould, *Oospora crustacea* Sacc. = *Torula sporendonema* Cke., was observed. This Hyphomycete occurs on various decaying substances, including cheese, glue, etc. We have seen it only on the rotting jute.

In August a brick-red mould was noticed in small tufts on different parts of the remaining undecomposed fragments of the rug. This was found to be *Gymnoascus Reesii* Baran, belonging one of the lower groups of Ascomycetes. When examined under a pocket lens it has all the appearance of a Hyphomycete. It is a coprophile by nature. Another coprophile, *Podospora fimesida* (Ces.&D.N.), made its appearance about the same time.

We fully expected *Coprinus domesticus* putting in an appearance either the first or second year, before the rug was completely broken up, but it did not oblige. It was met with on old sacking in a field corner in the next valley, Luddenden Dean.

It was rather remarkable that there should spring from the debris two Agarics of the genus *Hebeloma*, one of which, *H. fastibile* Fr., we had not seen in our district before; the other, *H. mesophæum*, had been met with in one other place only.

Another peculiar circumstance was noted. There came in the same spot the following year a fine tuft of *Bolbitius flavidus* (Bolt.), one of Bolton's species, figured on Tab. 149 of his 'History of Funguses Growing about Halifax.' This tuft is the only one of this plant we have had the good fortune to see.

The bacteria were not studied, but doubtless there would be numerous species in all employed in breaking down the various materials.

Of fungi proper, 17 species were noted; possibly one or two micro species may have been overlooked. The 17 consist of:—

4 BASIDIOMYCETES.

- | | |
|--------------------------------|--------------------------------|
| 1. <i>Plurotus septicus</i> . | 3. <i>Hebeloma fastibile</i> . |
| 2. <i>Bolbitius flavidus</i> . | 4. <i>H. mesophæum</i> . |

11 ASCOMYCETES.

- | | |
|---------------------------------|----------------------------------|
| 5. <i>Anixia spadicea</i> . | 11. <i>Humaria deerata</i> . |
| 6. <i>Perisporium vulgare</i> . | 12. <i>Ascophanus carneus</i> . |
| 7. <i>P. funiculatum</i> . | 13. <i>Orbilia vinosa</i> . |
| 8. <i>Podospora finisida</i> . | 14. <i>Gymnoascus Reesii</i> . |
| 9. <i>Onygena pilogena</i> . | 15. <i>Bolacotricha grisea</i> . |
| 10. <i>Peziza linteicola</i> . | |

1 MELANCONIACEÆ.

- 16.
- Libertella fusispora*
- .

1 HYPHOMYCETES.

- 17.
- Oospora crustacea*
- .

The habitats of the whole may be classified as follows:—

Only known to occur on animal substances, as woollen materials, bone, horn, hoofs, skin, feathers, etc.—No. 9.

On cheese, glue, etc., sacking—No. 17.

On manufactured linen, jute, cotton, etc.—Nos. 10 and 16.

Possibly No. 16 will yet be found on rotting twigs.

On rotting leather, cloth, old rope, sacking, cotton, paper, dung of horse, cow, and rabbit—No. 12.

On leather, bark, wood, old rope, cloth, sacking—No. 13.

On rotting worsted, cloth, wood, straw, herbaceous stems, paper, dung, and sacking—Nos. 6 and 7.

On decaying twigs, leaves, grass, fungi, dung, and sacking—No. 1.

On rotting straw, herbaceous stems, cloth, and sacking—No. 5.

On decaying herbaceous stems and sacking—Nos. 11 and 15.

On dung and sacking—Nos. 2, 8, and 14.

There are only two, Nos. 3 and 4, out of the seventeen, real humus species. The spores of these may have already been in the ground when covered by the rug. Most likely the developing mycelium penetrated the overlying substance and produced

sporophores as if growing out of it. At the Cadeby Foray held in 1901, the mycelium of *Tricholoma leucocephalum* had penetrated a dead hedgehog squashed flat on the floor of the wood, and, to all appearance, the sporophores, six or seven in number, were growing directly out of the dead animal.

The rug was as little disturbed as possible, sharp scissors or knife being used to cut off the pieces taken away for examination.

Our thanks are due to Mr. Massee for checking or identifying several of the less-known species.

MOLLUSCS.

***Azeca tridens*, etc., in Lincolnshire.**—While out for a short ramble on 1st September with Mr. A. R. Yeoman, M.A., of Newcastle, I turned over a few pieces of timber in Acthorpe Wood, near Louth. Under one piece I found a single specimen of *Azeca tridens* var. *nouletiana*. Being anxious to find additional specimens, I have since visited the wood a few times and find them to be fairly common; on the second occasion I collected fourteen. Acthorpe Wood is on the boulder clay and consists chiefly of Oak, Elm, Ash, and Chestnut trees, and a considerable amount of herbage, amongst which was the somewhat rare Sedge—*Carex lævigata* and *Juncus bufonius*; two varieties of Bramble were particularly noticeable, viz.:—*Rubus corylifolius* and *R. glandulosus*. The plants were identified by Mr. F. Arnold Lees, who, with some members of the Louth Ant. and Nat. Soc., visited the wood on 19th September. In order that the identification of the *Azeca tridens* should have equal value with previous new records for the county it has been submitted to Mr. J. W. Taylor, who kindly verified it. Other species found in the same place on the few visits in September were:—*Arion ater*, *A. intermedius*, *A. circumscriptus*, *Limax maximus*—at 4 p.m. I saw one adult eating a fungus (*Agaricus* sp.), *Limax arborum*, *Agriolimax agrestis* var. *sylvatica*, *Agrio. lævis*, *Vitrina pellucida*, *Vitrea cellaria*, *V. alliaria*, *V. pura* var. *margaritacea*, *Euconulus fulvus*, *Pyramidula rotundata*, *Hygromia hispida* var. *hispidosa* and var. *albocincta*, *H. rufescens*, *Vallonia pulchella*, *V. costata*, *Helicigona arbustorum*, *Helix aspersa*, *H. nemoralis* vars. *libellula* and *rubella*, *Cochlicopa lubrica*, *Jaminia cylindracea*, *J. muscorum*, *Balea perversa*, one empty shell, *Clausilia laminata*, *Carychium minimum*.—C. S. CARTER, Louth, 1st October 1904.

MOLLUSCA OF DRIFFIELD AND NEIGHBOURHOOD.

REV. E. PERCY BLACKBURN.

THREE years' residence (from 1901 to 1904) in the Driffeld section of the East Riding has given me an idea of the mollusca of the district. A good amount of work has been done in the past by various workers, qualified and otherwise, and some of the results have been published. But no properly-prepared list is available to-day. In order to help towards such list I give below the result of work done by myself and family.

But before doing that may I be allowed to urge that the district be more systematically worked. The plan adopted of going again and again to one place is what is needed. Haphazard visits are not enough. Cannot the country-side be mapped out and an area given to a single worker, or, better still, two workers who will make a series of visits with careful observation in wet weather and fine. A uniform schedule as to place, soil, the nature of the waters and vegetation, and any other local details should be prepared and used by all workers. What is perhaps most needed and offers most opportunity for original research is a series of observations on the habitat, dispersal, food, and habits of the mollusca, the relation of soil, food, and lack of food to size and colouring. The question of food is an interesting one, and is not by any means exhausted. Some of these details have been given in part, but the subject is far from exhausted.

I have done next to nothing in collecting any of the *Limacidae*, *Arionidae*, and other orders of slugs. Most of the ordinary kinds are found in abundance.

LIMAX FLAVUS and *L. MAXIMUS*. I have found large specimens in my own garden.

ARION INTERMEDIUS is fairly common in the district.

AGRIOLIMAX AGRESTIS is, of course, everywhere. I noticed on several occasions that *A. agrestis*, which is often straw-coloured, has a way of crawling up to the top of the grass stems and resting there. At a distance it looks exactly like a head of grass.

VITRINA PELLUCIDA is found all over, and some of the specimens are uncommonly beautiful.

VITREA CRYSTALLINA can be found pretty nearly anywhere in the district, and the specimens are usually fine.

VITREA LUCIDA, supposed to be a South Country shell, we have found at Tibthorpe, and Mr. J. W. Taylor emphatically says it is correctly named.

VITREA CELLARIA, *V. ALLIARIA*, and *V. NITIDULA* are found in abundance.

VITREA PURA is found commonly.

VITREA RADIATULA we have found on two occasions at Hornsea on the south side and has been verified by Mr. J. W. Taylor; also at Kelleythorpe Marshes.

ZONITOIDES NITIDUS we believe is found in the district, but it needs verifying.

EUCONULUS FULVUS is common everywhere.

PUNCTUM PYGMÆUM. Tibthorpe Wold Chalk Pit.

PYRAMIDULA ROTUNDATA is found fairly generally, but not in great numbers. We have taken it on Wansford Road, Scarborough Road, King's Mill, Cowlam, Sledmere, Bainton.

HELLICELLA VIRGATA is found in great profusion. At Nafferton the sward on the roadside is alive with it. At Kelleythorpe we found some large specimens. One measured 13 mm. across. The varieties are very marked and beautiful.

HELLICELLA ITALA is rather rare. We have taken it at Tibthorpe, on the Scarborough Road, near Brandesburton, Cowlam, Fimber. It is very plentiful where it is found but is very local.

HELLICELLA CAPERATA is somewhat local. We have taken it largely at Hornsea on the bent grass; also at Flamborough, Cowlam, Tibthorpe, Scarborough Road, and Pockthorpe Road, Driffeld, but not commonly.

COCHLICELLA CANTIANA we have taken at Flamborough, Bridlington, Foston (in abundance, fine specimens with very red lips), North Frodingham, Bainton, Rudston, Skipsea, Hornsea, Driffeld, Kelleythorpe, Lund Wold. This species differs much according to the food it eats and its surroundings. Where these snails are found on lush grass swards they are large in size, thick in substance, and the part near the mouth of the shell is very dark red to pinkish. On the other hand where they are found on the roadside, especially on nettles, of which they are very fond, they are smaller in size, almost transparent, and the veins and other body markings are very pronounced and beautiful. At first sight the markings appear to be in the shell.

HYGROMIA GRANULATA (Jeffries' *Helix sericea*) needs confirming.

HYGROMIA HISPIDA with its variety *HISPIDOSA* is very common.

HYGROMIA RUFESCENS is found pretty generally. It varies much in colour. It is found in great abundance on the reeds near the canal on the Wansford Road.

VALLONIA COSTATA we took in a chalk pit at Tibthorpe.

VALLONIA PULCHELLA in fair quantities on Wansford Road, Scarborough Road, and generally.

HELICIGONA ARBUSTORUM is found at Croom, near Sledmere, only.

HELIX ASPERSA is found generally. The markings have been very deep during the last three years, but the variety of them has not been nearly as great as we have found in other districts. Whether it is a question of soil or weather remains to be proved.

HELIX NEMORALIS is common, the banding very various. A colony on Nafferton Road had defective and broken bandings on a pink ground; the animals were of a lightish colour, some of them being of a beautifully-mottled green and slaty colour. But there was no uniformity about them. The animals were dark when you expected them to be light and vice versa. The lightest shells had the darkest animals in.

HELIX HORTENSIS is not common. We have taken it at King's Mill, Driffeld, Bainton, Kirkburn Road, Tibthorpe, and Lund Wold.

ENA OBSCURA is found on the Wansford Road, Scarborough Road, Driffeld, near Middleton Ings, Tibthorpe, and York Dale.

COCHLICOPA LUBRICA is found everywhere in isolated specimens but never in colonies.

CÆCILIOIDES ACICULA has been taken by Miss Piercy in a chalk pit at Tibthorpe, July 1904.

JAMINIA ANGLICA we have taken twice at Flamborough Head.

JAMINIA CYLINDRACEA. Hornsea, Wansford Road, Driffeld, and Tibthorpe.

JAMINIA MUSCORUM. On Wansford Road and at Tibthorpe.

VERTIGO PYGMÆA we have only taken in Tibthorpe. Mr. Petch secured one at Kelleythorpe.

VERTIGO ANTIVERTIGO. Kelleythorpe, taken by Mr. Petch.

CLAUSILIA have been found by us only at Croom, Sledmere, and York Dale.

CLAUSILIA LAMINATA and CL. BIDENTATA are both found.

I do not understand the scarcity of *Clausilia* in the district. In a similar district on the chalk hills of Buckinghamshire they abounded on the beech trees. I have looked on beech trees all through the district but found none except near Sledmere. This fact wants investigating.

SUCCINEA ELEGANS is common along the canal bank, and in streams and ponds in the neighbourhood. We have taken it fairly generally. Some of the finds were very large. I have taken it at Hornsea.

SUCCINEA PUTRIS is not so common, though I have found it at Hornsea and Wansford Road, Foston, and Rotsea.

CARYCHIUM MINIMUM we took in plenty at Flamborough Head, also at Sledmere and Wansford Road.

ANCYLUS FLUVIATILIS is found generally in the streams especially on Foston side of Driffeld.

ACROLOXUS LACUSTRIS is common on the reeds of the canal at Wansford. I have also taken it in an old pond at Skerne.

LIMNÆA AURICULARIA we have taken in the Foston streams and canal; also at Hornsea Mere, Rotsea Carr, Wansford Road.

LIMNÆA PEREGER. Everywhere. The rare form *stagnaliformis* we took in Kirkburn Gypsey Race.

LIMNÆA PALUSTRIS is found in the canal and trout streams of Driffeld, Kelleythorpe Marshes, in Foston streams, and Hornsea, and is fairly distributed. The specimens are very fine.

Var. CORVA we have taken, and the same vole-eaten at Driffeld.

LIMNÆA TRUNCATULA is found everywhere. A wold pond near Cottam abounded in the same, perhaps carried by the sheep, or maybe having travelled, as is their wont, overland. The Hornsea Mere specimens are remarkable for their clear reddish horn colour.

LIMNÆA STAGNALIS is found in the canal, Foston streams, Hornsea Mere, North Frodingham. At North Frodingham they were very large in a pond in a field. Also in a drain near the canal they were plentiful.

Of the freshwater mollusca :

PLANORBIS CORNEUS we have taken plentifully in streams at Foston, and also at Rotsea Carr and Kelleythorpe Marshes.

PLANORBIS ALBUS is common from Hornsea to Driffeld, and generally.

PLANORBIS CRISTA at Foston and Hornsea.

PLANORBIS CARINATUS and P. UMBILICATUS are common.

PLANORBIS VORTEX is also common.

PLANORBIS SPIROBIS is not so common, but is found at Hornsea, and in the Foston streams and the canal.

PLANORBIS CONTORTUS is fairly common.

PLANORBIS FONTANUS we have taken at Hornsea, North Frodingham, and Wansford.

PHYSA FONTINALIS abounds.

APLECTA HYPNORUM we have taken in a stream near Hornsea Mere. It is said to have been found at Driffield, but the record needs confirming.

BITHYNIA TENTACULATA and *B. LEACHII* are very abundant in the canal and streams, Wansford and Foston. So also are

VALVATA PISCINALIS and *V. CRISTATA*. *V. piscinalis* is unusually large and plentiful.

NERITIMA FLUVIATILIS is common in the river at Rotsea. A few specimens were found by Rev. F. H. Wood at the lock on the Wansford Road in the dead weed on the bank.

ANODONTA CYGNÆA is found at Foston. One specimen taken was 14½ cm. × 7 cm. and weighed a little over 8 oz.

SPHERIUM CORNEUM is common and fairly distributed.

SPHERIUM LACUSTRE we have taken at Rotsea and Tibthorpe.

PISIDIUM AMNICUM. Driffield.

PISIDIUM SUBTRUNCATUM = FONTINALE. Driffield, Rotsea, Beeford and Skipsea, Tibthorpe Wold.

PISIDIUM PULCHELLUM. Lowthorpe, Beeford and Skipsea, Hornsea.

PISIDIUM PUSILLUM. Driffield, Foston, Rotsea, Hornsea, Tibthorpe Wold.

PISIDIUM PUSILLUM var. CINEREA. Rotsea and Foston.

PISIDIUM NITIDUM. Kelleythorpe, Beeford and Skipsea, Skerne, Tibthorpe Wold.

PISIDIUM OBTUSALE. No records.

PISIDIUM GASSIESIANUM. Driffield, Hornsea, Lowthorpe, Skerne, Tibthorpe Wold.

Nearly every pond, stream, and drain in the district has *Pisidia* in it, and the species are well distributed. The Tibthorpe Wold record is from a wold or made pond on Mr. Piercy's farm cleaned out about seven years ago. It is now full of *Pisidia*. This pond is about 400 feet above the sea level. The above list is by no means exhaustive, but is a list of finds localised and named.

On the lacustrine deposit at Skipsea I found a number of well-preserved specimens. They are, of course, very brittle. What struck me most about them was their almost identical similarity to present-day shells. I secured specimens of *Bithynia tentaculata* and *B. leachii*, one repaired, one with an operculum in situ, one with a brown stain, the remnants of an epidermis. Amongst other things I found a tiny operculum of an immature *B. tentaculata*, *Limnæa pereger*, a fragment of what I deem to be *Physa fontinalis*, *Valvata cristata* and *V. piscinalis*, *Spherium corneum* with both shells attached, and, as far as I could tell, *Pisidium amnicum* and *P. roseum*. There were broken pieces of either an *Anodonta* or a *Unio*, but the shells were not complete enough to identify.

‘GOOD KING HENRY’
(*CHENOPODIUM BONUS-HENRICUS* L.).

WALTER JOHNSON,

Battersea.

ONE of my earliest recollections is that of a garden in North-East Lincolnshire, where, in addition to the old-fashioned vegetables, there grew a luxuriant bed of what was locally termed ‘Marquery’ (pr. *mark-wery*), or ‘Markery.’ This vegetable, which in after years I was to know under the high-sounding names of Mercury Goosefoot, or Good King Henry, and botanically as in the above title, was cut in late spring and early summer, and formed a delicious edible, particularly when accompanied by boiled ham or bacon.

A short description of Marquery will be sufficient, since any good Flora will supply omissions. Alone of the ten British species of the genus *Chenopodium*, Marquery is a perennial. It is a dull, dark-green, succulent plant, with a thick, fleshy rootstock, stout, channelled stem, and triangular-hastate leaves with slightly sinuate margins. The stem and the undersides of the leaves are powdered with a whitish meal, which makes the plant soapy to the touch. The clustered flower-spike, which appears from May to August, is greenish, inclining to red, and quite unattractive to the mere collector. After consulting the various authorities on botany, one gets an impression that the plant is fairly common, or perhaps one should say, common.

Concerning the names of our plant, much may be written—it is necessary, however, to use considerable judgment. The name of the genus, *Chenopodium*, is obviously taken from the Greek *χῆν*, goose, and *πούς*, *πόδ-*, a foot, an origin reflected in the popular name—goosefoot, applied to all the included species. This principle of nomenclature is well illustrated in such names as Coltsfoot, Crowfoot, Bearsfoot, Cocksfoot, and Birdsfoot trefoil; the last two names, however, have reference to the fruit, not the leaf of the plant. Our particular species, Marquery, according to Loudon, has the corresponding name in Italian, Anserino, in Dutch, Gansevoet, and in German, Gänsefuss, another designation being Meldenartige. The French name, given by Syme and Sowerby, is *Anserine bon Henri*, introducing an eponym which will be discussed presently. Now, although the leaves of the *Chenopodiums* are very variable in form, those of Mercury Goosefoot and one or two other species justify, by

their shape, the popular and the generic names. But why 'Mercury' or 'Markery'? It may, perchance, have been transferred from the Dog's Mercury (*Mercurialis perennis*), or the Annual Mercury (*M. annua*), because of a fancied connection between the plants, each having a 'hard' green colour, and the leaves of some goosefoots being of a shape similar to those of the mercuries. The god Mercury is apparently involved in the christening ceremony of all three, but why, is a mystery. The English Dialect Dictionary gives references to variants of 'Mercury,' in use in several of the Northern Counties, and quotes the catalogue of a Lincoln seedsman, 'Marquery, a Lincolnshire Perennial Spinach,' but there is no hint of the etymology. There is a further name—All-good, which clearly points to the value of Marquery as food. Henry Lyte (1578) wrote 'Algood groweth about wayes . . . and pathes, and by hedges,' and he gives cognate equivalents in 'high Douche,' 'Frenche,' and 'base Almaigne.' Coles (1677) alludes to 'All-good, herb Mercury, Good Henry.' Here, and in the French *Ansérine bon Henri*, we come to a real difficulty, which is increased by considering that we have now added another word—'King'—Good King Henry.

Is the name Good King Henry ever employed by country people nowadays, or is it a mere book-name, kept alive by botanists? Gerarde, in whose *Herbal* the term seems to appear for the first time, says that in his day it was in use in Cambridgeshire. It would be pertinent to ascertain if anyone who has not learnt the name from books or botanists has ever been known to use it. Dr. B. C. A. Prior, quoted by Syme, remarks, 'Good Henry, or Good King Harry; German, Guter Heinrich; Dutch, Goeden Henrik. An obscure name, which Dodonæus (Dodoens) tells us was given to the plant to distinguish it from another one, called *Malus Henricus*, but why they were either of them called *Henricus* we are not told.' Britten and Holland suppose that *Malus Henricus* was our *Lathræa squamaria* [L.]. If we now turn to Grimm's 'Teutonic Mythology,' we get a possible clue. Grimm says that *Atriplex*, which is a genus closely allied to *Chenopodium*, is called *Stolz Heinrich*, or Proud Henry. *Roth Heinrich*, Red Henry, also figures in Northern folk-lore. 'I account for it' (the name), he says, 'by the old belief in elves and kobolds, for whom *Heinz* or *Heinrich* was a favourite name, which was always transferred to devils or witches, and to such demonic beings was ascribed the healing virtue of the herbs.'

Other conjectures have been rife as to the derivation of Good King Henry. Someone started the hypothesis that Henry VI., called in his own days Good King Harry—(is this historical?), the founder of Eton College, and a great favourite with the monks, is the Henry referred to, and that these monks, who named many plants, introduced the term in gratitude to their benefactor. Dr. Prior drily says, 'It has nothing to do with Harry the Eighth and his sore legs, to which some have thought it referred.' Perhaps we have here an after-thought, for Ray (1660) notes that the plant serves 'to cleanse dirty ulcers, and to heal them; and, as a poultice, to soothe the pains of gout.' Another claimant has been put forward. Dr. Withering refers to a French writer—a writer whom Mr. Britten searched for in vain—who states that 'This humble plant, which grows on our plains without culture, will confer a more lasting duration on the memory of Henri Quatre than the statue of bronze placed on the Pont Neuf, though fenced with iron and guarded with soldiers.' There is another local term for all the *Chenopodium* group, namely, Fat Hen, and were not the fear of Professor Skeat and Dr. Murray before one's eyes, along with deserved censure for those who guess at etymologies, this nickname might be used to support the claims of our own Henry the Eighth, and the French Henry IV. Our monarch was corpulent, truly Fat Henry, and was it not Henri Quatre who promised that every peasant should have a fat hen in his pot? But laying aside this trifling, it is necessary to state that the English Dialect Dictionary says that the name Fat Hen is applied to other plants also; to the Ground Ivy in Bucks, the Corn-Marigold in Hants, and to the Shepherd's Purse in Gloucestershire. To sum up this question of nomenclature: facts seem to point to a German origin. Mr. Britten thinks this very likely; from Guter Heinrich to Good Henry—the 'King' not at first being interpolated—is not a much greater step than from the commonly accepted Gromwell to the Shropshire 'Oliver Cromwell.'

If the inquirer consults books as to the use of Good King Henry as an esculent, he may be led astray. Some of the earlier authorities appear to have copied from each other, and when later editions of their works were issued, mutual checking from the original loose statements fixed a misunderstanding. Anne Pratt (1855) says, 'The leaves when boiled form a tolerably good vegetable, resembling spinach; and the plant was of old times much cultivated in gardens, and was so very generally a few years since, in the cottage plots of Boston, in Lincolnshire.'

And again, it is 'still occasionally boiled in cottages.' Syme and Sowerby (1863) record that Good King Henry 'even in the beginning of the present century (i.e., the 19th) was highly esteemed in Lincolnshire and some of the Midland counties, but it is now little used.' Similar quotations might be added, but these will suffice. Dr. Rhind (1874), indeed, says 'Lincolnshire is the county where it is most in request.' 'Occasionally,' 'little used,' 'early nineteenth century'—whoever gave this information? Why, Good King Henry is to-day one of the most popular vegetables in the county of the old Lindiswaras. Friends tell me of its being in great demand in the East Riding and in Durham; I believe also, in Norfolk. Whilst living on the Southern borders of the West Riding, over twenty years ago, I never observed it, either in gardens or on sale in the markets. For some years past I have had supplies sent Southwards, and those who have tried the vegetable pronounce it to be better than the London favourite, the annual spinach, which is also a member of the Natural Order *Chenopodiaceæ*.

For the purpose of information it may be stated that the leaves and stems of Marquery are the parts eaten. The best period for gathering is about the end of May and onwards to mid-June, when the plant has a kind of 'heart' and has not yet begun to flower. When this takes place the stalks tend to become stringy. Writers say that the young shoots are used as a substitute for asparagus, but this has not come within the writer's experience. The portions plucked should undergo a series of careful rinsings. The boiling varies according to fancy, about one hour being the average duration. Plain sauce to this plain herb, and we have a dish fit for a prince.

A few gardeners nip off the flowers of Marquery as soon as they appear, and contrive to get a smaller crop, a sort of aftermath, in late autumn, but this process, of course, impoverishes the plant for the succeeding year. Marquery may be propagated either from seed or from offsets from the root. By adopting the latter method a good close bed can be secured in two or three years. A few plants of White Goosefoot (*C. album*) almost inevitably appear in the bed as weeds, and though the horticulturist ruthlessly uproots these it is not likely that they would greatly injure the flavour of the cultivated herb when put into the saucepan. It is passing strange that Southern gardeners have not thought of growing Marquery. Loudon, it is true, actually gives directions for its cultivation, but no one can be expected to grow everything mentioned by

Loudon, and, in default, the virtues of the royal vegetable are unsung.

The distribution of Good King Henry in a wild state has always been a puzzle to me, and for a long time I have suspected that in Eastern England, at least, it is an introduced plant. On referring to Watson (*Cybele Brit.*) it was seen that that illustrious botanist also questioned its nativity. It is labelled 'viatical.' 'Many of its stations may consequently have originated from gardens. Perhaps it would better be referred to the English type of distribution and be treated as a species not indigenous beyond the Grampians, if native anywhere beyond the Highland provinces.' Again (*Top. Botany*), he says, 'The indigenoussness of this plant is looked upon with doubt, more especially so in Scotland, where few writers declare it truly native.' Dr. W. Rhind would seem to assume that Marquery is native, for he speaks of the 'superior docility' of spinach which has been long under cultivation, whereas 'Good King Harry,' 'which makes a very estimable spinach or asparagus in its native country, might make but a very sorry one if removed to a place where it is not indigenous.' Assuming that Britain is here intended to represent the native place of the plant, we must set against this implication Hooker's statement that Marquery is distributed in Europe and Siberia, but is introduced in North America. Incidentally it may be remarked that a fore-elder of the present writer, finding the plant absent in California half-a-century ago, introduced it to San Francisco, with what results cannot be now ascertained. Bentham gives the habitat thus: 'On waste grounds, near villages and sheepfolds, in the mountain districts of Europe and Russian Asia, except the extreme north. In Britain, chiefly on roadsides near villages and dwellings, but in many places introduced only, having been formerly much cultivated as a pot herb.' Hooker's habitat is much the same: 'Waste places, often near houses.' Babington's is but slightly varied: 'Waste places, near villages.'

Now, it is the tendency just alluded to, the affection for villages, sheepfolds, farm-buildings, and the bases of church-yard walls, which forms the suspicious feature about the occurrence of Good King Henry. Without pressing the argument too far, a marked and constant attachment for such neighbourhoods frequently points to alienism. Thus, the Common Wallflower (*Cheiranthus Cheiri*), a regular denizen of old castle walls, is commonly deemed to be a foreigner of rather

late appearance, and the Greater Celandine (*Chelidonium majus*) either hovers around the outskirts of hamlets in such a manner as to suggest its immigration along with early Teutonic settlers, or clings to the garden hedge like a runaway that has not quite made up its mind to desert its adopted home. Whether Good King Henry is in like case or not,—and the problem is much complicated by the admitted influence of human agency in certain localities, the writer is bound to say that whenever he has found the plant at some distance from a garden plot the circumstances have suggested an artificial origin. In Lincolnshire this has almost certainly been the case. Of other localities personally noted, not too numerous, I may mention Crosby, in the Isle of Man, where two or three roots were growing in August, 1897, at the foot of a wall enclosing a farmyard, whilst at that time there was no bed of Marquery in the garden a score of yards away. In July, 1896, I found a specimen near a very old garden wall at Mortlake, Surrey, and this plant most probably arrived there by accident, since there must always be a considerable interchange of stock in districts devoted to the growth of vegetables and flowers, and stray plants will appear even though not actually cultivated. Brewer's 'Flora of Surrey' (1863) gives about half a score of localities in the county, chiefly near churchyards and old walls, but it would now be difficult to find Marquery in the places mentioned. Curiously enough, one haunt, Battersea Fields, about a mile from where these lines are penned, now forms the site of the beautiful Battersea Park. The record may indicate former cultivation of Marquery in the parish, for Battersea was long famed for asparagus and other garden vegetables. De Crespigny's 'New London Flora,' compiled much later (1877), cites several Surrey habitats of the herb, and notes its occurrence as 'frequent.' In company with a botanical friend, during the summer of 1904, I paid a visit to some of these places, but the quest was unsuccessful. There was abundance of *C. album* and some *C. rubrum*, but no Good King Henry. In one locality, Thames Ditton, there was, indeed, a Goosefoot with the halberd-like leaves of Marquery, but the thin, poor foliage, quick to wilt and shrivel, the lack of mealiness with the consequent absence of the soapy touch, the excessive branching, and the general aspect, showed that it was an impostor. It happens that Syme and Sowerby describe a variety of *C. eu-rubrum*, which they call *Pseudo-botryoides*, and mention Thames Ditton as a locality. From a study of the plate accompanying the letterpress it looks

as if the plant shown were identical with the one found. In truth, the Goosefoots are a variable genus. Is it possible that some of the annual species hybridise? Another question which arises is, whether all our records of Good King Henry are sound, or whether it has often been mistaken for other Goosefoots. Of course, there are plenty of good records. The back volumes of the 'Naturalist' testify to these. Thus, observations for Cumberland appear in 1886 (p. 331), 1890 (p. 333), etc.; Yorkshire, 1886 (p. 140), 1895 (p. 13), etc., and so for the other Northern counties. An inspection of the Floras of other districts would doubtless supplement the list. Watson (*Cybele*) estimates that Good King Henry is found in seventy counties in Great Britain, the Southern limit being Cornwall, the Isle of Wight, and Kent, and the Northern, Ross, Moray, and Dumbarton. Yet, subject to correction from other observers, I venture to doubt whether the plant is as common as the textbooks would indicate. We know that this discrepancy is noticeable with several herbs formerly employed as esculents, flavourings, or specifics, which, having once been more abundant, are still so described. Henbane, Borage, and Deadly Nightshade will serve as examples, and I would suggest a partial reason for the erstwhile abundance in the cultivation of these plants in the old-world olitories attached to mediæval mansions and monastic foundations.

That Good King Henry is of widespread occurrence has been already shown, but this does not necessarily preclude the supposition that the plant is a stranger in our isles, although these might be expected to fall within the zonal range. The vertical range is also very great—from 1,200 feet according to Hooker (300-400 feet, Watson), in the North of England, down to what is practically sea-level in Lincolnshire—within a stone's throw of the curious maritime relatives of Marquery. In the summer of 1904, I noticed Good King Henry at great heights in Switzerland. At Schwarenbach, at the lower end of the Dauben See, near the Gemmi, it grows at a height of about 7,000 feet. At the hamlet of Findelen, near Zermatt, where, Baedeker tells us, we find the highest cornfields in Switzerland, it reaches 6,800 feet, whilst on the Riffel Alp, also near Zermatt, it actually occurs at 7,300 feet above sea-level. The plant is rankest and most plentiful in the fertile soil near the cowsheds and chalets, a fact noticed by the peasants, who, however, declare that it has not been cultivated there. But this is by no means its only habitat. Gremlı says, 'Rubbish heaps, road sides;

everywhere.' The word 'everywhere' would appear to extend the meaning of the previously-mentioned and more restricted habitats, but the plant does not seem very common in the lowlands. A day's herborising on the alluvium which lies between Lakes Neuchatel, Bienne, and Morat, failed to reveal its presence, although it seems to be independent, to some considerable degree, of geological conditions. It is quite as much at home on the Jurassic limestones as on the crystalline rocks. The local name, presumably a German patois word allied to Heinrich, is Heiminie or Heimen—the spelling is mine host's. The peasants sometimes cook the plant for the table in spring, but the practice does not appear to be common. This neglect of a wholesome vegetable food, by the all-too-poor labourers in Switzerland and at home, is simply deplorable.

Putting together the foregoing considerations, it seems probable that Good King Henry is an introduced plant in Eastern England. One wonders whether the Dutch, who helped to drain the Fens, and who left their influence both in our architecture and agriculture, were responsible for the importation. Or was it at an earlier period that the teutonic tribes, intentionally or by oversight, carried across the North Sea the seeds of the savoury herb? In this connection, and especially as touching the use of the name Good King Henry in the Cambridgeshire of Gerarde's day, it is of prime importance to remember the German term, which is the equivalent of our own. It is also more likely, *à priori*, that an introduced plant or a garden escape should, after becoming generally distributed, come to be looked upon as indigenous, than that a rank, hardy perennial like Marquery, should be so extremely partial to particular artificial habitats, and those habitats most usually near the dwellings of man. For, though Marquery may prefer cultivation, it is sturdy enough to thrive in any moderately good soil, and will exist exiguously among the dust at the roots of old masonry, or by the dry highway. The problem as to how it may have climbed the Pennines is more perplexing. One dare not do more than make the hint. Such mountaineering feats, occupying the course of centuries, are not unknown, and, at any rate, there seems to be a fair case for investigation.

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FIELD NOTES.

ARACHNIDA.

***Obisium muscorum* at Maidenwell, near Louth.**—On 21st August, when searching for mollusca under pieces of wood, etc., in a dry ditch, by the roadside between Haugham and Ruckland, I found a single example of the Pseudo-Scorpion—*Obisium muscorum*—which has been submitted to Mr. H. Wallis Kew, F.Z.S., London, who kindly verified its identification.—C. S. CARTER, Louth, 30th September 1904.

'Book Scorpions' at Haugham, near Louth.—On 28th August I was searching under pieces of timber in an old cart shed at Haugham for false Scorpions, and was surprised to find the 'Book Scorpions' (*Cheiridium museorum*) in such numbers that I failed to keep count how many I caught. As their movements are not so rapid as the *Chelifer latreillii* and *Chthonius rayi* it was not difficult to catch them; in fact, immediately they were touched they mimicked death. In splitting open some very much decayed wood I found them inside. A number were sent to Mr. H. Wallis Kew, F.Z.S., London, who kindly verified their identification. At Mr. Kew's suggestion I made a few notes regarding the shed. Its size was about 20 feet × 14 feet, the open side facing the west. The floor was chalk over—

laid with very dusty soil. One corner of the shed was used for storing soot. The false Scorpions were even amongst the soot. No fowls are kept near the shed. With the exception of a few spiders and 'wood worms' there did not appear to be any other life whatever.—C. S. CARTER, Louth, 30th September 1904.

HYMENOPTERA.

***Sirex noctilio* at Louth, Lincolnshire.**—On Monday, 5th September, Mr. J. Larder sent to me an example of *Sirex noctilio* Fab. (= *S. juvencus*) which had been caught in the town. This species is uncommon in this district; only one specimen, I believe, has been previously recorded.—C. S. CARTER, Louth, 30th September 1904.

LEPIDOPTERA.

The Melanic Forms of *Venusia cambricaria*.—Referring to *Venusia cambricaria* on p. 206 of the 'Supplement to the List of Yorkshire Lepidoptera,' we read, 'Mr. T. A. Lofthouse takes near Middlesbrough a very pretty melanic form in some numbers; and Mr. L. S. Brady takes the same form commonly near Sheffield.' At the time I wrote this I had not seen any of the Sheffield specimens, but from the description of the form given to me, was under the impression it was the same as that occurring at Middlesbrough. During the past summer, however, Mr. Brady kindly captured and sent me specimens of his form, when I at once realised that I had been quite mistaken in regarding it as identical with the Middlesbrough variety. The melanism in the Middlesbrough moth consists in a large increase of the black on the ordinary pale ground of the anterior wings, the hind wings remaining almost normal. The Sheffield moth, on the contrary, has the markings normal, but on a deep lead ground colour, which colour pertains to both fore and hind wings. Both forms are distinctly melanic, but it is curious and remarkable that the melanism should take altogether different directions in the two districts.—GEO. T. PORRITT, Huddersfield, 11th November 1904.

FLOWERING PLANTS AND FERNS.

Note on Nomenclature.—In the November 'Naturalist,' p. 348, Miss S. C. Stow records *Alopecurus fulvus* Smith from S. Lincolnshire. Adding a syn. *A. æqualis* Sobol., this name,

which is taken up in the new ed. of Babington, will not be familiar to British botanists generally. It was published in Sobolewski's 'Flora Petropolitana,' etc., 1799. As the name is taken up by Ruprecht (1845), and also by Ledebour, Fl. Rossica, iv., p. 465, 1853 (though he refers to Ruprecht), it is probably correct; and as Smith's was not published (English Botany, t. 1467, 1st June 1805) till 1805, Sobolewski's name takes precedence. Richter, Pl. Europ., i., p. 38, 1890, makes it a var. of *geniculatus*, but this had previously been done by Weinman ('Flora Petropolitano,' p. 10) in 1837.—A. BENNETT.

***Osmunda regalis* at Goathland.**—I do not remember seeing in the programme of the Y.N.U. excursions to Goathland, any mention of the above-named fern as growing there. If it has been overlooked, I should like to place it on record that in former years it was very common in a little copse at Darnholm, adjoining Mr. Matthew Leng's pasture and garden. Before the railway was removed to its present route, and when the carriages were drawn up the old incline by a rope attached to a standing engine at the top of the hill, the engine-driver always had three or four plants of this fern in pots in his engine-room. He began selling them, and practically cleared the plant out of the district. Mr. Leng, seeing this wholesale destruction, took up the few ferns that remained and planted them on his side of the hedge with some large clumps that were already there. I believe these still remain.—JNO. BRAIM, Pickering.



MOSESSES AND HEPATICS.

***Tortula lævipiliformis* DeNot.**—A New Observation.—This moss, growing on trees near Lewes, Sussex, and related to *T. lævipila*, was kindly sent to me by Mr. W. E. Nicholson. On examining it under the microscope, I observed young plants formed *in situ* in the middle of the rosette of brood-leaves. This fact is not mentioned by Correns, who has carefully examined and described the structure of this moss. Correns grew the 'brood-leaves' in nutrient fluid, and found that they produced protonemal threads, on which young moss-plants then arose. This, however, took place only after the brood-leaves had become free and detached from the plant. Correns says these leaves become broken off at their bases, where there is a zone of thin-walled cells.—WM. INGHAM, 15th October 1904.

***Riccia sorocarpa* Bisch.**—This rare hepatic I found in fine condition for fruit, in a stubble field at Langwith, in the East

Riding, on 19th December 1902. I believe it is an addition to Yorkshire hepatics. It was associated with the rare *Fossombronia cristata*, and both hepatics were abundant. It is noteworthy that in the same month *Riccia glauca* occurred in a similar field on Strensall Common, but unaccompanied by a *Fossombronia*.—WM. INGHAM, 15th October 1904.

***Jungermania minuta* Crantz.**—This very minute and rare hepatic I found in a wood on Strensall Common on 16th August 1904. It was growing on dead sticks and bits of heather, and associated with *Lepidozia trichoclados* C. Müll. This latter was first described as a British hepatic in 1902 by Mr. Macvicar. I believe Mr. Slater has this *Lepidozia* from Wheeldale, Goathland, in one of his old gatherings. Mr. Macvicar approves of my naming of the above hepatics.—WM. INGHAM, 15th October 1904.

***Scapania aspera* in West Yorkshire.**—Mr. Ingham states on p. 309 of 'The Naturalist' for last month that this species has 'not hitherto, I believe, been recorded for the West Riding.' It was recorded by me on p. 12 of this periodical for January last as being frequent in every limestone district of West Yorkshire. I distributed numerous specimens over twenty years ago under the name then given to it by my constant correspondent, the late H. Boswell, of Oxford. I always thought that it might be another species, so when sending my friend Mr. Macvicar a large number of Scottish species for his forthcoming 'Census of Scottish Hepaticæ,' I took the opportunity of sending him specimens from between Buckden and Grassington, etc., and he pronounced them to be true *S. aspera*.—W. WEST, Bradford.

ALGÆ.

Diatoms at Spurn.—Some rather interesting gatherings were made from algæ growing in tidal pools on the Humber side of the peninsula on the occasion of the recent visit of the Yorkshire Naturalists' Union to Spurn. The most noteworthy were an abundance of *Actinocyclus Roperii*, a species which Norman records (under the old name of '*Coscinodiscus ovalis*'), as rare in Ascidian gatherings. The fact that it is now found plentifully at Spurn goes to confirm my previously expressed opinion¹ that all the species found by Norman in the stomachs of Ascidian Molluscs may eventually be discovered on our coast.

¹ Trans. Hull Scientific and Field Naturalists' Club, Vol. 1, Part 4., 1901.

I have also to note the addition of three species to the records of the Hull district, being those marked* in the following list of species found at Spurn on this occasion. Those marked† were abundant.

- | | |
|--|---|
| † <i>Achnanthes brevipes</i> var. <i>minor</i> Ag. | <i>Nitzschia acuminata</i> (W.Sm.) Grun. |
| † <i>Actinocyclus Roperii</i> (Breb.) Kitt. | <i>Nitzschia constricta</i> (Greg.) Grun. |
| <i>Actinoptychus undulatus</i> Ehr. | <i>Nitzschia Sigma</i> W.Sm. |
| <i>Amphiprora alata</i> Kutz. | <i>Nitzschia spathulata</i> Breb. |
| <i>Amphora angusta</i> Greg. | <i>Orthotropis lepidoptera</i> (Greg.) Cl. |
| <i>Amphora costata</i> W.Sm. | * <i>Plagiotropis gibberula</i> Grun. |
| <i>Amphora exigua</i> Greg. | <i>Plagiotropis vitrea</i> (W.Sm.) Grun. |
| † <i>Amphora hyalina</i> Kutz. | <i>Pleurosigma angulatum</i> W.Sm. |
| <i>Amphora lineolata</i> Ehr. | <i>Pleurosigma æstuarii</i> W.Sm. |
| <i>Amphora salina</i> W.Sm. | <i>Pleurosigma Balticum</i> W.Sm. |
| † <i>Cocconeis scutellum</i> Ehr. | <i>Pleurosigma distortum</i> W.Sm. |
| <i>Coscinodiscus decipiens</i> Grun. | <i>Pleurosigma fasciola</i> W.Sm. |
| <i>Hantzschia marina</i> (Donk.) Grun. | <i>Pleurosigma intermedium</i> W.Sm. |
| † <i>Licmophora Anglica</i> (Kutz.) Grun. | <i>Pleurosigma macrum</i> W.Sm. |
| <i>Melosira nummuloides</i> (Bory) Ag. | * <i>Pleurosigma obscurum</i> W.Sm. |
| <i>Melosira sulcata</i> (Ehr.) Kutz. | <i>Pleurosigma quadratum</i> W.Sm. |
| <i>Navicula arenaria</i> Donk. | <i>Pleurosigma subsalinum</i> Per. |
| <i>Navicula didyma</i> Ehr. | * <i>Raphoneis amphicerus</i> Ehr. |
| <i>Navicula digito-radiata</i> | <i>Rhabdonema arcuatum</i> (Ag.) Kutz. |
| var. <i>Cyprinus</i> W.Sm. | <i>Schizonema crucigerum</i> W.Sm. |
| <i>Navicula fusiformis</i> | <i>Schizonema ramosissimum</i> Ag. |
| var. <i>ostrearia</i> (Gaill.) V.H. | <i>Schizonema Smithii</i> Ag. |
| <i>Navicula granulata</i> Breb. | <i>Scoliopleura tumida</i> (Breb.) Grun. |
| <i>Navicula litoralis</i> Donk. | <i>Scoliopleura Westii</i> (W.Sm.) Grun. |
| <i>Navicula marina</i> Ralfs. | <i>Surirella gemma</i> Ehr. |
| <i>Navicula palpebralis</i> Breb. | <i>Surirella ovalis</i> var. <i>salina</i> W.Sm. |
| <i>Navicula pygmæa</i> Kutz. | † <i>Synedra affinis</i> var. <i>tabulata</i> Kutz. |
| <i>Navicula scopulorum</i> Breb. | |

♦ ♦ ♦

GEOLOGY.

Boring at Woodhall Spa.—A new well is being sunk by Mr. R. Adolphus Came for the purpose of tapping the noted Woodhall Spa mineral water. The well has already reached a depth of over 250 feet, and is still in hard blue clay. Judging from the fossils recently turned out—*Gryphea dilatata*, *Ammonites cordatus*, *Belemnites Owenii*, *Thracia depressa*, etc.—the work is now proceeding in the Upper Oxford Clay, and it is estimated that the mineral spring will be reached at something like 350 feet. Mr. Came is exercising great care in preserving the various rock specimens and fossils as they are found, with their relative depths, and this may lead to a better understanding of the underground strata in this part of Lincolnshire.—HENRY PRESTON, Grantham.

REVIEWS AND BOOK NOTICES.

A Monograph of the British Desmidiaceæ. By W. West, F.L.S., and G. S. West, M.A., F.L.S., A.R.C.S. Vol. I. Ray Society. 324 pp. Price 25s. net.

This valuable work supplies a long-felt want and will be absolutely indispensable to all microscopical students who wish to obtain a knowledge of this beautiful family of freshwater algæ. Hitherto we have been mainly dependent on the works of Ralfs (1848) and M. C. Cooke (1887), both of which in the light of Messrs. Wests' book must be regarded as very incomplete, as well as somewhat out of date. To show the advance that has been made in this branch it is only necessary to say that Ralfs described 162 species and 32 varieties, and Cooke 290 species and 48 varieties, while Messrs. Wests' book, when completed, will give full descriptions and figures of about 690 species and 450 varieties. It is interesting to note that the majority of the additions are due to our authors' own investigations. A critic with a bias in favour of 'lumping' might be tempted to suggest that there has been an undue multiplication of species and varieties, and that further research may not improbably result in the discovery of intermediate forms involving the abandonment of some separate species. Even if it be so the fault is, at least, one on the right side. It is well that differences, however minute, should be brought under the notice of other observers, as the study of them may bring out new and valuable facts, and the progress of science can be trusted to eliminate those cases where permanent variation cannot be demonstrated. In any case it must be admitted that Messrs. Wests' work is well done. The specific and varietal distinctions are lucidly described, and the localities given for verification of records are exceedingly numerous. It is confidently to be hoped that the issue of this book will result in attracting to the study of Desmids an increasing number of observers, for the existence of a good text book enabling the student to identify his finds is a great incentive to research. It will then follow that districts not hitherto worked will be systematically taken in hand. Messrs. West have done wonders in the extent of country they have covered, but of course it was impossible for them to go everywhere.

The introduction is a clear and interesting summary of modern scientific views on the biology and evolution of these organisms. A specially suggestive paragraph is that on 'Locomotion.' The facts detailed therein should serve to shed

light not only on the long vexed problem of the nature of the motion in the allied branch of the Diatomaceæ, but also on the question of direction of germination in the vegetable kingdom generally. The quotation from Warming that the movements are due to the 'protrusion of a mucilaginous stalk' would, however, be less misleading to novices if it had a mark of interrogation appended. As it is, they might think the suggestion had the author's approval.

Another luminous paragraph is that on 'Phylogenetic Relationships.' Taken together with the unique 'Genealogical Tree' on p. 22, it gives a strikingly clear description of the position of Desmids in the Vegetable Kingdom.

The illustrations are mostly original, and they do much credit to the skill and accurate observation of the artist (Mr. G. S. West). The reproduction of his drawings has also been highly successful, and very few similar works on Natural History can compare with this in truth and delicacy, which are the elements of beauty.

R. H. P.

How to make a Rock-Soil Flora. By E. Adrian Woodruffe Peacock. Goulding, Louth. 1s. 20 pp.

This short paper by a keen field-botanist contains suggestions of interest to all botanists. Many will agree with the opening sentence: 'No such thing as an ideal flora exists for a Watsonian county or vice-county.' From a page of somewhat sweeping assertions, we gather that the author proposes with the aid of the Geological Survey Drift Maps and by outdoor observations to record the species of plants peculiar to the various rock-soils of a district. This aim is ideal, but, as the author says: 'It is absolutely useless to begin making notes with a view to a soil-flora, till we have perfectly clear ideas about rock-beds, etc.' Herein lies the crux of the whole question. The table of soils given in this paper is probably as good as any other, but its application in the field will prove hard to any but an expert geologist. The Drift maps do not give the necessary information, and they are only issued for sale for small areas of Britain, while the small scale only allows the larger patches of drift to be shown. In spite of the difficulties of the subject, the author contrives to convey much information which is all the more valuable because it is largely self-acquired and is the result of experience. The methods of taking notes (which cannot be summarised here) are worthy of imitation. The author uses too many contractions, but he does not expect others to do so:—

Naturalist,

'We can contract the localities and plant-names as we like. The botanist must, however, add all the frequency signs at once on the spot, or they will never be properly done.' Examples are given from the author's extensive Soil-Register. We must confess to a certain amount of difficulty in following the method and in applying it so skilfully as the author does; it is a case of practice bringing perfection. The paper contains the nucleus of what is bound to become an important branch of District Botany, and should be read by all those who are interested in new developments of the subject.

W. G. S.

The Natural History of Some Common Animals. By O. H. Latter, M.A. Cambridge University Press, 1904. Pages x. + 331.

In this volume the author gives nine chapters dealing with the natural history of those animals which usually serve as types of animal structure in elementary courses of zoology. He has, however, confined his remarks to such forms as can be observed without the aid of the microscope. The subjects are varied, and include such items as Earthworms, Crayfish, Cockroach, Freshwater Mussel, Snails and Slugs, Frogs, etc., Amphibia, internal parasites, Dragonflies, and Wasps. The last two are included on account of the interesting nature of their life-histories—and partly to bring forward the phenomena of metamorphosis. The strong point in the author's work, however, is his endeavour to present each animal to the reader as a *living* thing—his long experience as a teacher of zoology convincing him that too much attention has been paid to structure, and too little to function. The book is written in a clear and concise manner, and will prove of the greatest service to students. It also contains numerous references to the literature of the various subjects dealt with. The illustrations are numerous and there is a very good index.

Our Country's Animals and How to Know Them. By W. J. Gordon. Simpkin, Marshall, Hamilton, Kent & Co. Ltd. 6s.

The animals referred to in the title include the mammals, reptiles, and amphibians only, others being dealt with in separate volumes. There can be no doubt that this little book is of the greatest service in identifying the various mammals, reptiles, and amphibians to be found in and around Britain. The 33 coloured plates show the main external features of the animals, though they are rather highly coloured. Further on in the book will be found a large series of drawings of skulls of the different mammals, those of the Whales, etc., being particularly valuable and complete. Local and popular names are given, there is a useful glossary of terms used, and a fair index. Whether in the hands of a young or old naturalist the book will be found exceedingly useful and can be recommended.

'The Annual Report and Transactions of the North Staffordshire Field Club,' for 1903-4, has been issued, and contains a useful record of work. The membership of the Society is 469.

'The Ninth Quarterly Record of Additions to the Hull Museum' has been issued (June, Publication No. 20, 40 pp., one penny). It is devoted largely to rare china and antiquities, but has the following notes of natural history interest:—'A Tooth of a Bear from Bridlington,' 'Remains of the Lion in East Yorkshire,' 'A Rare Crustacean,' 'Local Shells,' 'Spring Flowers,' and 'Local Wild Mammals.'

The Rev. Francis C. R. Jourdain, M.A., reprints two useful lists from the Derbyshire Archæological and Natural History Society's Journal for 1904. One is 'The Lepidoptera of Derbyshire' and the other 'The Hymenoptera Aculeata of Derbyshire.' They are sold at threepence each by Charles Hales, St. John Street, Ashbourne.

NORTHERN NEWS.

The Annual Meeting of the Yorkshire Naturalists' Union will be held at Leeds, on Saturday, 17th December.

A collection of 72 choice photographs issued by the British Association Geological Photographs Committee has been placed on exhibition in the Bootle Museum.

The Manchester Geographical Society still continues to issue its valuable Journal, containing illustrated articles on various subjects dealing with different parts of the globe. One part (Vol. 19, pts. 7-12, July to December 1903) has recently been issued.

In order that there may be no misunderstanding, we would like to point out that the death we recorded in the November Naturalist (page 352) was of Mr. John Carter, of Bradford. His son, Mr. J. W. Carter, F.E.S., our valued contributor, is still with us, and we hope will be for some time to come.

Together with Mr. W. B. Wright, Mr. Herbert Brantwood Muff has prepared a scholarly paper on 'The Pre-glacial Raised beach of the South Coast of Ireland.' It has been published as Vol. 10, Pt. 2 of the 'Scientific Proceedings of the Royal Dublin Society,' and is illustrated by numerous plates.

Mr. Joseph F. Pickard, Leeds, has handed to the Secretary of the Yorkshire Naturalists' Union a complete 'list of plants seen by the Union during their excursion to Baugh Fell, Sedbergh, from 1st to 5th August 1902.' This may be referred to by anyone particularly interested in the district.

We have received a communication from Mr. Fawcett, of Satley, with reference to paragraphs in 'The Naturalist' for December and March last on the occurrence of the Red Spotted Bluethroat and Black Redstart respectively at the Durham side of Tees mouth. Our correspondent states the records referred to are not the first, as he knows of other instances of earlier date in the county of Durham.

In Vol. 6, pt. 3, of the Proceedings of the Malacological Society, Mr. G. C. Crick has a paper 'On a new form of Carboniferous Nautiloid (*Amphoreopsis paucicamerata*) from the Isle of Man.' This is based on a specimen in the collection of Mr. Robert Law, and was obtained from the Poolvash Limestone, at Poolvash, on the southern coast of the island. Mr. Crick has not been able to find any record of a similar nautiloid from the Carboniferous rocks.

The following note appears in the Natural History column of a recent issue of the 'Yorkshire Weekly Post':—A few days ago a respected poultry dealer in High Bentham exhibited outside the shop a heron that had been shot in the neighbourhood. It was for sale, and the bird is now in the hands of a 'stuffer.' The shop in question is a few yards off the local police station, which by-the-way was probably a safeguard against prosecution. As a matter of fact, the Wild Birds' Protection Act—as we have shown over and over again—is a farce.

CLASSIFIED INDEX.

COMPILED BY W. E. L. WATTAM.

It is not an index in the strict sense of that term, but is a classified summary of the contents of the volume, arranged so as to be of assistance to active scientific investigators, the actual titles of papers not being regarded so much as the substantial nature of their contents.

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CORRIGENDA.

- Page 166, line 38, for *Strobilomyees* read *Strobilomyces*.
 „ 166, „ 40, for *Periclymeum* read *Periclymenum*.
 „ 170, „ 2 from bottom, for *Melanopyrum* read *Melampyrum*.
 „ 171, „ 3, for *Neckerea* read *Neckeria*.
 „ 171, „ 15, for *Aperina* read *Aperine*.
 „ 171, „ 12 from bottom, for *Filix-mass* read *Filix-mas*.
 „ 171, „ 2 from bottom, for *Anthriscus* read *Anthriscus*.
 „ 173, „ 6, for *cornucopiodes* read *cornucopioides*.
 „ 173, „ 13, for *saxatalis* read *saxatilis*.
 „ 182, „ 12 from bottom, for mosses read masses.
 „ 303, „ 31, for *asplneoides* read *asplenoides*.
 „ 304, „ 1, for Cohn read Colm.
 „ 304, „ 3, for *Andraea* read *Andreæa*.
 „ 304, „ 9, for *asplneoides* read *asplenoides*.
 „ 304, „ 19, for *petrophylla* read *petrophila*.
 „ 304, „ 9 from bottom, for *Hymnum* read *Hypnum*.
 „ 342, „ 4, for **Stemonites** read **Stemonitis**.
 „ 343, „ 4, for **nemerosa** read **nemorosa**.
 „ 343, „ 15, for hetonic read ketonic.
 „ 343, „ 24, for enemonin read anemonin.
 „ 344, „ 23 and 26, for cuicin read cnicin.
 „ 344, „ 24, for and read 8.
 „ 345, last line, for vegetable read vegetative.
 „ 346, line 9, for trelelase read trehalase.
 „ 346, „ 10, for trelalose read trehalose.



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PREFACE.

AGAIN it is our privilege to thank our numerous contributors and subscribers for their assistance during the past year, and for their frequent words of appreciation of our efforts to render the journal popular, readable, and at the same time of real service to Northern Naturalists. We are also grateful for the help rendered in the matter of illustrations. These have unquestionably added much to the value of the journal.

An effort has been made to report the meetings of the Yorkshire Naturalists' Union promptly, as well as to bring before our readers particulars of any important observations or discoveries made, at the earliest possible moment. As in past years also, the journal has been in our readers' hands regularly on the first day of each month.

One or two branches of Natural History have apparently been neglected during the past twelve months, as compared with previous years, but this is the fault of the contributors, not of the editors. It is hoped that next year there may be a more representative set of papers dealing with the vertebrates of the county.

The publication of Masee and Crossland's 'Fungus Flora of Yorkshire' during the past year is an event worthy of record, and it has been arranged to publish supplementary lists of fungi obtained on the forays in the Miscellaneous volume of 'Transactions of the Yorkshire Naturalists' Union,' though general accounts of the Forays, as well as particulars of the more important discoveries made, will appear in this journal as heretofore.

The absence of Mr. Woodhead from England for the greater part of this year has thrown the work in connection with the journal entirely upon the shoulders of his colleague, who is, therefore, solely responsible for any shortcomings there may have been.

Mr. W. E. L. Wattam has again kindly prepared the Index.

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All communications to be addressed to the Hon. Sec.,

T. SHEPPARD, F.R.S., Museum, Hull.

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THE IRISH NATURALIST.

A Monthly Journal of General Irish Natural History.

BOTANY. ZOOLOGY. GEOLOGY.

EDITED BY

GEO. H. CARPENTER, B.Sc., R. LLOYD PRAEGER, B.A., AND

ROBERT PATTERSON, F.Z.S., M.R.I.A.

This MAGAZINE should be in the hands of all NATURALISTS interested in the distribution of animals and plants over the British Islands.

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THE NATURALIST

FOR 1905.

NOTES AND COMMENTS.

WEARDALE NATURALISTS.

The Weardale Naturalists' Field Club and their editor, Mr. W. M. Egglestone, are to be congratulated on their 'Transactions,' two parts of which have been issued, together



Calcareous Deposit from Middridge Coal Mine.

comprising 250 pages. Whilst some of the notes do not bear much upon the district, the greater part have reference to the natural history, geology, or antiquities of Weardale and its vicinity. The 'Transactions' are printed upon good paper, and have many illustrations, two of which are reproduced herewith. The first is a photograph of a curious deposit, described by Mr. T. Teasdale as a 'Bird-nest stalagmite.' It is of quite recent origin, and consists of a number of calcareous pebbles—each having a nucleus of silica, in a hollow or nest. Such deposits occur in some of the Durham coal mines. The second illustration

is of a Falcon's eyrie in North Yorkshire, and is one of several illustrations to 'Northern Notes on British Birds,' by Mr. Egglestone. Amongst the various subjects dealt with in these two



Falcon's Eyrie, Yorkshire.

volumes are Geology, Antiquities, Birds, Plants, Entomology, Folk Lore, etc. The 'Transactions' are cheap at half-a-crown each part.

COAST EROSION.

In a paper recently read to the Institution of Civil Engineers, Mr. E. R. Matthews, Borough Engineer of Bridlington, gives a useful summary of the rate of erosion of the coast of Yorkshire from Flamborough southwards. He also gives a very concise history and details of the cost of the various groynes and other protective works that have been erected on this part of the coast for the purpose of saving the land from the ravages of the sea.

COST OF PROTECTING THE COAST.

Mr. Matthews suggests that the erosion of the cliffs between Bridlington and Spurn should be checked as follows:—(a) by the erection of 340 long low timber groynes, i.e., 10 to each mile of coast; (b) a sea-wall, similar to that designed and carried out for the Bridlington Corporation, erected along the entire

coast line. The cost of scheme (a), at £324 per groyne (or £3,400 per mile of coast), would be £110,160; the cost of (b) being £19 per yard, £33,440 per mile, or £1,136,960 in all; the total cost of the work therefore would be £1,247,120. We are informed by Mr. Matthews that 'the value of the land is only one-third of what it would cost to protect it by means of groynes, which are only a partial remedy.' He also states 'the question naturally arises, 'who should bear the cost of these extensive coast-protection works'?' Just so—that's the difficulty! If it were not for some such trifle the work might have been carried out long ago, and in place of our picturesque cliffs we might have had one long, straight, monotonous sea-wall, relieved here and there by band-stands and hot-pea and ice-cream stalls! Undoubtedly, however, the erosion of our coast is a serious matter, though not so serious as the cost of protecting it. There will still be some work for the Yorkshire Coast Erosion Committee for years to come.

LANCASHIRE BORINGS.

Mr. T. Mellard Reade favours us with a reprint of his paper 'On some Borings at Altcar made by the Lancashire and Yorkshire Railway Company.' The author considers that the bores 'have supplied a most interesting confirmation of the accuracy of his geological map and sections, published by the [Liverpool Geological] Society in 1872, and *proves beyond cavil* that the whole of the beds underlying the Superior Peat and forest-bed are marine or estuarine.' If this is so, the borings are indeed important. Another conclusion arrived at in the same paper is that 'the pre- and post-glacial deposits of this neighbourhood constitute a most interesting geological record of frequent vertical oscillations of the land, which may fairly be described as pulsations of the mother earth.' One fails to find any reference to the action of ice in the formation of the superficial deposits of the district, unless the term 'glacio-marine' comes under that category. Mr. Reade's paper occupies eleven pages, eight of which are filled by the harmless but apparently necessary 'List of Foraminifera' by Mr. J. Wright. As we have previously pointed out the foraminifera no more prove the marine origin of the glacial beds than do the fragments of basalt, etc., found in the same deposits, prove that the drift was formed by a volcanic eruption.

WEEDS.

A. H. PAWSON, J.P., F.L.S., F.G.S.

Being his Presidential Address to the Yorkshire Naturalists' Union, delivered at Leeds, 17th December 1904.

IN doing me the great honour of choosing me for your President for this year you have departed from your ordinary practice of placing at your head a man of scientific renown, and have contented yourselves with a simple lover and observer of Nature.

I freely acknowledge that I do not feel myself equal to occupy a position which has been filled by those whom I regard as my masters—by men of untiring investigation and of original research. And yet in this Society of ours—in this Union of Societies—it seems fitting (though not perhaps in my own person) that another phase of Natural History study should be represented.

The workers—the searchers into causes—are the men at whose feet we sit, whose sacrifices win them immortal names—but how few are their numbers among the crowd of Naturalists! From my own point of view I fancy sometimes that these great men, conscious of their own toils, are apt to value too lightly those Nature lovers who confine their pleasant labours to the observation and enjoyment of this green Earth and its occupants. Yet Nature, the garment of the living God (if I may be allowed to transpose the translation), is, before everything, a manifestation of surpassing beauty—of absolute perfection of form and colour—of inconceivable ingenuity of adaptation and design—and this has certainly been given to us for our delight.

When we consider how generally disregarded is this wonderful revelation, how few people take any notice at all of birds, and clouds, and trees, and waters, and rocks, and flowers, and shells, counting them as common and matters of course, and turning carelessly away from the priceless pleasure which their study offers them, I think that naturalists of all types and of every calibre, however fortified by science or profound in research, at all times and at all costs, ought to endeavour to the utmost of their powers to turn the attention of these heedless ones to the treasures they are throwing away with both hands, and that they ought to value and encourage the humblest and most ignorant of those who follow Nature from the love of her. For, from whom are the ranks of the workers to be recruited if Nature has not a large following?

I am disposed to grow even more bold in the cause of these Nature-lovers—these priests of Nature,

‘Who by the vision splendid
Are on their way attended.’

I am reminded of the exclamation of the first Medici Pope when he heard that the Conclave had elected him : ‘Since God has given us the Papacy let us enjoy it!’ You have made me your President, and I will say my say.

I value a naturalist of the type of Thoreau, of John Burroughs, and beyond all of our own Richard Jefferies (for with him I am most familiar), to whom Nature was the mother, companion, and friend, all unscientific though he might be, equally with those whose names are great in biology. Indeed, why should I compare the two who am not competent to make the preference. This is the celestial rivalry of the cherubim and the seraphim. ‘The cherubim know the most, and the seraphim love the most.’ How shall we say which are the greater ! The fact is that types of mind are various, and to different types different ends seem more desirable. Nature is eminently fitted to stimulate and to satisfy the sympathetic and the artistic faculties of mankind as well as those of pure reason and knowledge. She is the mother of poetry as well as of physics. We must therefore each enjoy and study her according to our varied insight, for in so doing we shall profit most.

Especially I think to the young should natural studies be made as alluring and attractive as they really are if properly displayed. The laborious and exact German opens his botanical primer with the cryptogams, and the poor children have to learn the microscopic habits of the fungi and the mosses, obscure and difficult, and to them of little interest, before they are taught anything about the flowers they love to pluck. This method reminds me of the ways of a school with which I was once acquainted, where the boys had to have two helpings of pudding before they were allowed meat. Such a regimen spoils a child’s appetite.

Let not then the botanical beginner be wearied with cell-structure and vascular bundles at the outset. Show him first the beautiful flowers of the field and teach him their ways and their habits. Take, from the wayside, a common dandelion, for example, and let him observe all its wonderful contrivances : how, its little flowers being so insignificant, it collects them together in a showy mass, conspicuous to the insects it wishes to attract, on a stalk which is itself a miracle of construction,

light, strong, elastic, and weatherproof, and which, moreover, is as full of life and movement and of so-called instinct as many animals ; how conscious of the disadvantage of inter-breeding, each little floret refuses to be fertilised by its own pollen ; how the mother-flower protects the whole family from rain and tempest ; how it rears itself aloft in the sunshine with ever-lengthening stem ; how, its blooming over, for greater security it lies down to ripen its seed ; the seed ripe, how it rises again above the herbage and sends its progeny forth on the breeze to colonize and to conquer. Thus will the interest and admiration of the youth be excited ; so will he, when the time comes, enter with expectation and pleasure into the more hidden mysteries of plant life.

I propose now to offer you a few observations on the subject of Weeds—those plants which are the constant but undesired occupants of gardens and of cultivated ground. Usually no one has a good word for them, but to us naturalists every type of life is of abounding interest. Nothing is to us common or unclean. But weeds are in many ways extraordinary plants and they are in the highest degree worthy of our attention.

Our country has been for so many centuries inhabited and cultivated that, except on moors and mountains, rocks, sea-cliffs, shore-lines, and water-margins, almost every foot of it has been disturbed by agriculture, or by forestry, or by drainage. Still, there is no reason to believe that the plants which once occupied this cultivated ground have disappeared. They have been driven from the fields, but they still exist with probably few exceptions in the hedgerows, on the steep banks, along the streams, among the tangle, and on the fringe of woods and copses.

On the other hand, there can be no manner of doubt that the flowering plants at any rate have been greatly reinforced by this turning over of the land-surface. Many herbs which were introduced for food or medicine have gone wild and claimed permanent citizenship and many more have been brought here by accident ; but I do not speak of these.

The great woods and heaths of aboriginal England and its vast fens and marshes could not support so diverse a vegetation as a cultivated land, which has, in addition to remnants of these wild features, hedgerows with mounds and ditches, sheltering walls and sunny roadside wastes, fields drained and enriched, ponds, plantations and copses tended and thinned—each offering

varied conditions to suit a larger range of plants. When this great change by cultivation and surface disturbance came about—very slowly probably at first—the native flora would tend to change somewhat and to develop qualities and organs which would enable it to take full advantage of these altered conditions, and there can be little doubt that new species would gradually be evolved.

A garden or a ploughing-field is usually surrounded by hedge-banks, and woods and pastures are near at hand, all green with the natural vegetation of the district. One would think, therefore, that the weeds of the tilled ground would be the seedlings of the neighbouring herbage. But, in fact, they are nothing of the sort. Hardly one of them is to be found on a hedge-mound, or in a meadow or pasture, or in woods. In vain will you look there for the charlock that you hoe out of your turnips, or the groundsel that you pick off your flower beds. In truth, these plants could not live, not any of them, among the meadow-grass or with the wildlings under the hedges, for they are annual plants—all of them—and there is no room for them there: the ground is taken up.

Nature is sometimes rather an unnatural mother, if one may say so, and she seems to dislike these annual children of hers. There is no place for them anywhere: they are outcasts. They must exist where they can—on rocks, on barren spots, on the sea-shore, on ground which no one else covets. There they lurk in these unfavourable places, often dwarfed and stunted, living as best they may, but always on the look-out for some earth-slip or fall of rock, or other disturbance of the ground-surface which they may seize upon and occupy for a little while until they are dispossessed by the slow- but sure-moving perennials. I am afraid that annuals must be blamed (like the rest of us) for bringing much of their misfortune upon themselves. They are improvident creatures: they save nothing. Perhaps they have observed how we plunder the thrifty biennials (cabbages, turnips, onions, celery, and the like) of the stores which they have accumulated with so much labour, just as they are about to make use of them, treating them much as we do the poor hive-bees. Anyhow, they go in for a short life and a merry one. They feed near the surface with fibrous roots and get plenty of nourishment, but they store up none of it. They use it all as fast as they get it, to grow, and to flower, and to seed, and then, exhausted, and with no food to tide them over the winter, they die. Like other improvident people they usually have large

families which they leave quite unprovided for. These wretched children have no inheritance—not a spot of ground whereon to set their feet.

Nature evidently meant these annual plants to serve as a finishing-touch to her great scheme of decorating the earth—just to cover bare spots and to conceal blemishes : so she made them quick-moving (they will at need sprout, bloom, and sow their seed within the three months), and she keeps them always at hand (they are certain and profuse seed-bearers).

It is man who has been the great benefactor of the annuals. It is almost entirely to him that these plants owe their well-being and their numbers. When he began—no doubt at first with very rude pick or mattock, whether of bronze or iron I know not—to break into the earth and in the sweat of his brow to eat his bread they saw their opportunity. This was the supreme moment of their race. Down they came from the cliffs and crags, up from the sea-shore, across the sand-wastes, to enter upon this goodly land where they never before could obtain a footing. For them the golden age was opening. Man was going to cultivate annual crops and they could share the ground with them. Here, at last, in the cornfields, they would be free from the persecution of the hateful perennials ; for they could be in flower when the others had but just unfolded their cotyledons ; they could sow their seed in the furrows where their uprooted rivals lay withering.

Once in possession of the tilled ground the annuals have never left it, and they never will leave it until it is allowed to revert to its natural state, that is to say, until its reoccupation by the perennial plants of the district.

But we must not suppose that we have with us now the original settlers, any more than that we have as our neighbour the cave-man who lived on hips and haws, or the ancient Britons who painted themselves blue and drove about in chariots with scythes to their wheels. These wild annuals have become weeds. They have used themselves to rich living ; they have adapted themselves to their surroundings : they have thriven exceedingly and multiplied and increased. They are no longer the starvelings of the sands, the ragged regiments of the rocks, but plump well-nourished citizens with everything handsome about them. If our garden vegetables improve under cultivation, why not their companions, the weeds, who share their advantages ? It is not, therefore, strange (though at first sight it may appear so) that those plants which are our common weeds

are not to be found wild at all, but are the children of civilisation and cultivation only, like the common mouse, and the house-sparrow and the cheese-mite.

So far back, in some cases, is their origin, that their parentage can hardly be guessed. Groundsel, for example, is never to be found wild, and there is no wild plant from which it seems likely to have sprung. Its place of origin would appear to have been North Central Europe, for here it is most abundant and thriving. I have seen it in Sicily, but it is not happy so far south. Its two nearest relatives are *Senecio sylvaticus* and *S. viscosus*, but these are comparatively tender plants, shy and delicately bred ; while the groundsel itself, if it only has a bare spot, is the hardiest of mortals, blooming and seeding even in winter, refusing to yield to frost or to die when it is plucked from the ground, pushing out adventitious roots from the sides of its stem like a stone-crop, determined to flower and to fruit before it gives up the ghost. The fleshy leaves which provide it with this extraordinary vitality suggest a maritime origin or a very arid birthplace. Perhaps it may have come to us from the sea-cliffs.

About a fourth part of our annual plants are cornfield weeds—some 70 species out of 300—and their cradle-land is almost as undetermined as their parentage. 'Colonists' is the name given to them by Watson, but whence did they emigrate? Their present range extends over the cool climates of the world ; but we may at any rate set it down as certain that they are all plants of Central Europe or Central Asia.

Leaving weeds for a moment—there is not much fear that any American plant will get a strong hold of our ground, and still less formidable are those from the Antipodes. These are all introduced continually among seeds, wool, timber, and other produce ; but, although our climate is well suited to many of them, and though they have abundant choice of soil, since our island is an epitome of the geology of the globe, they rarely spread far from the canal-sides, the mill-yards, and the ballast-heaps. Aliens they are and aliens they will remain. They will never become colonists, for they cannot compete with the more vigorous forms of life which the keener struggle for existence among greater numbers has elaborated on the wider land-area of Europe and Asia. The great lakes of North America, with their vast freshwater surface, sent us the *Anacharis*, which seemed likely to be troublesome, but this seems to be now dying out.

In regard to the distribution of water-plants, it must be noticed that they have some advantage over their brothers of the dry land in extending their range of habitat, for they are dispersed not only as seeds but as plants. The waters tear them and distribute them over their lower course, especially in times of heavy rain and consequent inundation. These broken pieces remain plump and fresh in their own element and very commonly root and flourish on the spot where the flood has left them lying as readily as a gardener's cuttings.

There are also two waterside plants from America which are to be found here and there in England. These are *Impatiens fulva* (now *biflora*, a yellow balsam) and the yellow mimulus. Watson, in the volume of his 'Cybele,' which was published in 1870, speaks of this balsam as 'thoroughly established,' and couples it with the *Anacharis*; and Hooker, in his 'Student's Flora' of 1884, notes it as 'rapidly spreading.' It was first given a census-number of 7 in the eighth edition of the 'London Catalogue of British Plants,' published in 1883: but in the two editions which have followed, this small distribution in 7 out of 112 vice-counties has not been increased. I suppose there are many northern botanists who have never seen the plant. The mimulus we have all seen by village brooks in all parts of the country, but no one imagines for a moment that it can hold its own with the watercress or the brooklime, or the mints or the rushes. It can only be regarded as a garden-escape, easily carried by water, which roots easily in wet ground, and which is much preserved for its beauty.

The only other American plant, that I can remember, which has gained a foothold in our islands, is *Erigeron canadense*. This seems to be able to flourish in dry innutritious places where no native plant cares to grow. On the other hand, our common English plants have invaded temperate America much as the Anglo-Saxon race has done, and each year they penetrate farther into the country. I was told a few weeks ago by one of our members that he had heard from a correspondent in Dakota, which is in the very centre of the States, more than 1,200 miles from the sea-coast, that the yarrow and the plantain were first noticed in that neighbourhood last year, and that the dandelion and the wild chamomile have made their appearance during the present season. Three of these four you will notice are perennial plants, and one of them is an annual weed. The plantain would no doubt be *Plantago major*, to which the North American Indians long ago gave the name of 'the white man's foot,'

because it invariably accompanies the settler. We have all heard how in South America our thistles grow so rankly as to conceal a horseman, and how in New Zealand our watercresses choke up the rivers. I am told that in New Zealand, in which lonely islands the native vegetation is naturally particularly weak, nearly all the wayside plants are introductions from England. If the plants of America and the new countries are unable to colonise Europe, far less so are their weeds, for they have not had time to develop strong weeds of their own: their lands have not been long enough under cultivation. So at present the Eurasian weed holds the field in all temperate climates. What the ages may have in store for posterity we shall never know, but it seems likely that the vast cornlands of North America will have the opportunity of developing the most formidable agricultural pests of the future.

North and Central Europe and North and Central Asia must then be held to be the birthplace of our weeds and of their once truly wild ancestors. Some of them would spring from the north of this land-tract and others would originate farther south. Even now many of them keep their latitude pretty strictly. The poppies, so abundant in the South of England, grow less frequent as you travel north, and you lose them altogether at last. The annual mercury, the commonest weed of Central Europe, only just crosses the Channel.

We in England are in the north of this zone, and no doubt we have received some of our weeds from the south, as we have given it the groundsel and the chickweed. The bright-coloured poppies could hardly have been born under our leaden skies, nor was the corn marigold evolved here, although it now covers the fields of Orkney in autumn with the same gold with which in Malta it heralds the spring. Doubtless the scarlet pimpernel came to us from a sunnier land.

Inland rocks and wastes may have been the native home of many of these annuals, as the speedwells, the geraniums, the fumitories, and the small crucifers and labiates, for we find many species of these plants still there. Perhaps the Knotgrasses came from freshwater strands: most of the family love the waterside.

It seems as though many weeds originated, like our garden vegetables, near the sea. The cabbage, seakale, radish, carrot, celery, beetroot, and asparagus are all native maritime plants, and I think it likely that the parent of the charlock grew on the cliffs alongside the ancestor of the garden cabbages and turnips. The fleshy-leaved form of the scentless mayweed is

a wild plant of the sea-cliffs. The goosefoots, like the beetroot, certainly came from the sea-shore, for the whole order *Chenopodiaceæ* is littoral—*Chenopodium*, *Beta*, *Atriplex*, *Salicornia*, *Salsola*, *Suaeda*—every family of it. There are nine annual chenopodiums; eight of them are weeds, and the other is a plant of the sea-shore. This last probably represents the ancestor of the whole of them. These goosefoots are great hunters of manure-heaps; perhaps they find there the best substitute for the decaying refuse of their native sea-margin.

It is probable that weeds have, by modification of their organs, greatly increased their efficiency with regard to their surroundings beyond the ancient types from which they sprung—perhaps especially in flowering, in seed-bearing, and in seed-vitality—on the side of reproduction, in short. Perennial plants, confident in their own duration and in their increasing rootstock, trusting in budding rhizomes and rooting stems, and bulbils underground or in their leaf axils or in place of flowers, are often very shy and lazy seed-bearers. The little celandine, for example, and the cuckoo-flower, the lily of the valley and some of the garlies, will rarely trouble themselves about bringing up a family in the proper way, and the wood sorrel and many of the violets will only produce a few cleistogamous seed-pods. But to the annual plant seed-bearing is the only means of preserving its race: in this it never fails, and in this quality the weeds far excel the wild species. Economists tell us that when times are good there are fewer single people; men marry earlier and more children are born; and the flowers of the field seem to follow the same rule. In the midst of the riotous plenty of the ploughing-land our plants are wonderfully prolific; they know nothing of childless hearths and of barren marriages: they teem.

Also the seeds of many of them possess a marvellous vitality rivalling that of the fabulous mummy-peas. The plough goes over them and buries them deep beyond the influence of the life-giving sun, and the land is laid down to grass; yet thus will the charlock and the chickweed lie entranced like the Sleeping Beauty for a generation, to awake again when the ground is broken up and the sun-god kisses them.

But this effectiveness of weeds in cultivated ground—their abundance, their fertility, their strong hold on life—must not blind us as to their real weakness. They are efficient only among their present artificial surroundings. They have organised themselves only so that they may better inhabit cultivated ground. They have few points in common with a really

dominant race. If they have been modified from the old types, this has not been in a strengthening struggle for existence with forms almost equally strong. They have had no rivals; they have endured no hardships. They have rather developed their powers of enjoyment—of feeding on the surface in the rich and loosened soil—of expanding endless blossoms in the open sunny fields. How can creatures be strong when they lead such easy lives? They have the ground dug for them and manured for them. They are coddled and comforted like garden plants.

Therefore they do not spread over the country; they do not dispossess the wild annuals of their old haunts. They keep within their fenced cities: they do not dare to try their fortune in the open field; for they have become soft and enervated in their luxury and could not now maintain themselves on the shores and the sea-cliffs whence their ancestors emigrated. It is the fact that they can hardly exist outside walled ground. They lean entirely upon agriculture and upon man, and if he were to disappear from the earth, in a decade—nay, within a lustrum—there would hardly be a cornfield weed left in the country.

I chose this subject to-night because it is one which has always interested me, and as it seems to be rather neglected I thought I might perhaps be able to make a few remarks upon it which had not occurred to everybody; but I do not know that weeds are plants so especially suited to the consideration of naturalists after all, being, as they are, a sort of artificial vegetation. There is a kind of proprietorship in them, too. They belong to someone else, like the corn and the cultivated flowers. To have them of one's own, one must possess a ploughing-field or at least a garden; otherwise they must be sought for among the wheat or cabbages of someone else; and this is always repugnant to a true son of Nature who most properly considers that the universe belongs to him.

Ihm gehört das Weite was sein Pfeil erreicht

Das ist seine Beute was da kreucht und fliegt.

The whole earth is the hunter's within the range of his bow. I confess that my own heart is not in gardens and in cornfields, but in the woods and the hedgerows, and in the moors and the mountains. These are the true inheritance of the naturalist, for he knows that they belong to him by right and to none other.

Ladies and gentlemen, it is not necessary for me to commend to you the study of Natural History, for you are already engaged in it, and I am sure that there are few here who would

not be able to teach me many things in many branches of this delightful pursuit; but I hope I may be permitted to heartily congratulate each of you on belonging to the Naturalist Brotherhood, and to express my hope that your love of Nature may always continue and ever increase, and that you may be able to induce many to join our ranks. For whatever may be our talents we may here develop them; of whatever disposition we may be we may here gratify it. Here the artist has his model, and here the poet finds his inspiration. Nature will feed their fancy to the full, but they will never exhaust her, or even sound her depths. She is a past master in all the arts of construction and contrivance. The engineer and the architect and the shipbuilder are but her apprentices. Well and nobly may she occupy those who pass their lives in searching into her secrets, for only to the faithful and to the worthy will she reveal them. But it seems to me that it is to the common work-a-day world and to its ordinary toiling inhabitants that the love and study of Nature are most blessed. Here is recreation indeed! Care does not follow us into the open fields. A man must have great cause for gloom who can worry about his own affairs after he has spent half an hour with the stars. We are filled with the beauty of the world and forget our own sordid troubles. There is infinite comfort for us in the contemplation of the perfection of every flower and bird and insect, and there is unending interest in the study of them; and I truly believe that among all the changes and chances of this mortal life, which often prove many and grievous, we may here find an unfailing source of solace and refreshment and delight.

MOLLUSCS.

Limax tenellus in Yorkshire.—It falls to the lot of Mr. W. Thwaites, of Masham, to be the first to find this slug in Yorkshire. At the request of Mr. Roebuck, Mr. Thwaites made a special search for this species in suitable localities in his district, and in Hall Wood, Healey, about three miles from Masham, beneath fragments of wood, close to the root of a spruce fir, he found several individuals of the var. *cerea* of this species; this was about the middle of October. The wood lies low, close by the banks of the river, and not on high ground. *Limax tenellus* has also been found not uncommon in Epping Forest by Mr. T. Petch, of Hull.—J. E. CROWTHER, Elland.

THE FOSSILIFEROUS DRIFT DEPOSITS AT KIRMINGTON, LINCOLNSHIRE.*

J. W. STATHER, F.G.S

THE work on the important Kirmington section, which was begun in 1903,† has now been carried to a successful conclusion; and the results show that in some respects this section has no known parallel in English drift sections. A brickyard is worked at this place in a mass of warp or clay containing estuarine shells with a freshwater bed at its base, and this deposit is overlain by a bed of coarse flinty shingle, above which in one part of the pit there is found a few feet of red stony clay believed to be a boulder clay. The boring in 1903 proved the presence of a glacial clay at some depth beneath the warp. The chief object of our investigation has been to discover the relationship of the fossiliferous warp to the Glacial Series, and to carry the boring through the superficial deposits to the chalk, which was not reached last year.

During June 1904 a new boring was carried out under the personal supervision of the Chairman and Secretary, with the assistance of Mr. G. W. B. Macturk. Mr. Villiers, well engineer, of Beverley, undertook to put down the boring.

In order to secure a section in another part of the pit, the site of the new boring was fixed at a point 80 yards north-east of the previous boring. Although at the spot chosen the warp used for brickmaking had been excavated to a depth of five feet below the level of its base at the former site, this material was passed through in the new boring to a further depth of three feet, so that its base is here eight feet below its position in the former boring. The total depth attained by the new boring, combined with the height of the open section, was 96 feet, or 41 feet lower than was reached previously. The surface of the chalk lay much deeper than was anticipated, and the borings seem to prove that the surface features of the locality are not due to the presence of chalk, as hitherto supposed, but that the

* Report of Committee appointed to Investigate the Fossiliferous Drift Deposits at Kirmington, Lincolnshire, and at Various Localities in the East Riding of Yorkshire, consisting of Mr. G. W. Lamplugh (Chairman), Dr. Tempest Anderson, Professor J. W. Carr, Rev. W. L. Carter, Mr. A. R. Dwerryhouse, Mr. F. W. Harmer, Mr. J. H. Howarth, Rev. W. Johnson, Professor P. F. Kendall, Mr. E. T. Newton, F.R.S., Mr. H. M. Platnauer, Mr. Clement Reid, F.R.S., Mr. Thos. Sheppard, and Mr. J. W. Stather (Secretary).

† See 'Naturalist,' 1903, pp. 422-423.

rising ground has been formed by the erosion of a thick and complex mass of drift.

The diameter of the second boring was at first four inches, narrowing to three inches at a depth of 15 feet. It was found necessary to line the boring with tubes throughout.

The section seen in the brickyard and proved in the borehole was as follows:—

	ft.	in.
Surface soil (at 95 feet above O.D)	1	0
Clay with foreign stones*... ..	4	0
Well-worn shingle, principally of battered flints	8	0
Laminated warp with estuarine shells, and at its base a thin seam of peat associated with a sandy warp containing freshwater shells in one part of the pit†	18	6
Clean yellow sand, with pebbles of chalk and flint	4	9
Red clay passing downwards into tough reddish brown clay	7	6
Purple clay, streaked with silt and loam, passing downwards into tough purple clay with small stones including some erratics‡	10	6
Stoneless purple clay	5	0
Stoneless yellow clay	6	0
Flinty gravel... ..	4	6
Yellow clay and loam with small drift pebbles	5	0
Yellow sand, full of well-rounded quartz grains and specks of chalk	8	0
Yellow sand and laminated clay... ..	4	0
Tough compact lead-coloured clay, with a few small foreign pebbles§... ..	5	3
Tough yellow clay streaked with clalk	1	0
Solid chalk and flint	3	0
Total	96	0

Mr. Reid has examined the plant remains obtained from the band at the base of the warp and reports as follows:—‘The plant remains belong to the following species:—

<i>Ranunculus sceleratus</i> Linn.	<i>Lapsana communis</i> Linn.
<i>Eupatorium cannabinum</i> Linn.	<i>Mentha aquatica</i> Linn.
<i>Aster Tripolium</i> Linn.	Labiata (much crushed).

* Among the erratic stones which this clay contains the following were identified:—Basalt, porphyrites, rhomb-porphry, grits, etc.

† Mr. Clement Reid records from this bed *Scrobicularia piperata*, *Rissoa ulvæ*, *Tellina balthica*, *Cardium edule*, *Macra subtruncata*, *Mytilus edulis*, and abundant *foraminifera* (see Mem. Geol. Survey, Holderness, p. 58).

‡ In general appearance this clay resembles the purple clay of Holderness. Among the pebbles washed out of 30 lb. of the clay brought up by the augur, chalk and flint greatly predominate, but the following rocks were also represented:—Red chalk, black flint, Spilsby sandstone, ferruginous pebbles, quartz, basalt, and porphyrites, besides many undeterminable small pebbles.

§ This clay is hard and tough and very different from * and †, both in texture and colour. It resembles in colour the basement clay of Holderness. The pebbles are smaller in size than in ‡, and there is a still higher proportion of chalk and flint. Among the erratic pebbles the following are recognisable:—Basalt, porphyrite, sandstone, black flint, grit, quartz, etc.

<i>Atriplex?</i>	<i>Scirpus maritimus</i> Linn.
<i>Zannichellia pedunculata</i> Reichb.	<i>Scirpus</i> sp.
<i>Scirpus setaceus</i> Linn.	<i>Carex incurva</i> Lightf.

'The list is a small one, but it indicates estuarine conditions, and suggests a sub-arctic climate. With one exception the plants are still to be found in the neighbourhood of the Humber; but one of them, *Carex incurva*, is a sea-coast sedge not now ranging south of Holy Isle.

'A striking peculiarity of the deposit is the abundant remains of the estuarine sedge, *Scirpus maritimus*, a plant which, growing out of a few inches of water, tends to form a thick belt through which few drifted seeds would find their way. In view of the abundance of this sedge in the bed now examined and of the like-growing reed, *Phragmites communis*, in the deposit which I searched some years ago, the small number of other plants yet detected is not surprising. Land plants are only represented by two fruits of *Lapsana*, perhaps brought by birds. These fruits of *Lapsana*, as well as those of the sea-aster, are considerably smaller than my recent specimens, but I have not yet had an opportunity of comparing them with fruits of the same species near their northern limit.'

From the freshwater shell-bed associated with the peat Mr. E. T. Newton has determined *Planorbis spirorbis*, *Bithynia tentaculata*, with probably *Candona* (an Entom.).

GREAT LIMBER SECTION.

A boring was also put down under the supervision of Mr. G. W. B. Macturk, who kindly undertook to aid the Committee in this manner, at the Great Limber brickyard, three miles south-east of Kirmington, where there is a further development of warp and sand, believed by Mr. C. Reid to be of the same age as the Kirmington deposit, though no fossils have been found in it. The section seen in the brickyard and proved in the boring was as follows:—

	ft.	in.
Surface soil and clay with stones (at 110 feet above O.D.)...	4	0
Loamy sand contorted and mixed with warp	4	0
Laminated blue warp with sandy streaks	10	0
Pan	1	3
Current bedded sand	4	9
Sharp sand	8	0
Flint, sand, and rounded chalk pebbles	5	0
Solid chalk with flints	1	0
Total ...	38	0

In comparing this section with the one at Kirmington it should be noted, (1) that no shells have been found in the laminated warp at Limber; (2) that the warp does not rest on glacial clays; and (3) that the base of the Limber warp is 92 feet above O.D., or 28 feet higher than that of Kirmington.

It would be premature to discuss the problems raised by these interesting sections until the work of the Committee has been carried further.

Through the kindness of Mr. Reid the plant remains have been mounted and presented to the Municipal Museum, Hull.

During the present year the Committee intend to devote its energies to the section at Bielbecks and other sections in the Riding.

YORKSHIRE NATURALISTS AT LEEDS.

THE forty-third annual meeting of the Yorkshire Naturalists' Union was held at Leeds on Saturday, 17th December, in the rooms of the Philosophical and Literary Society, Park Row. The meeting was preceded by two excursions: the first started at 10 a.m., and consisted of the geologists, under the leadership of Mr. E. Hawkesworth. This party examined the sections in the gravels at Rothwell Haigh and Oulton, described on the programme by Mr. Hawkesworth. Another section, under the leadership of Messrs. S. Margerison and A. White, visited Roundhay Park, where special permission had been given to visit the greenhouses.

At 3.30 p.m., the sectional meetings having been held, about seventy members and delegates attended the General Committee meeting. The Report of the Executive Committee showed that the Union had had a most successful year. Two societies had become affiliated with the Union, and thirty-two new members had been elected. The excursions had been of a very profitable nature, and were well attended. The executive had also considered the question of the Union's publications, and had decided to issue Baker's 'North Yorkshire' and 'The Birds of Yorkshire' forthwith. Important recommendations from the Wild Birds' and Eggs' Protection Committee were also agreed upon.

The following excursions were arranged for 1905:—Ripon (in May); the Wolds (August Bank Holiday week-end); the Whitby district (early in July); Leyburn (Whit week-end);

Cudworth (September, Saturday); Fungus Foray, Roche Abbey and Maltby Woods (23rd September to 28th September).

On the invitation of the Bradford Societies the next annual meeting will be held at Bradford. The election of Mr. G. W. Lamplugh, F.G.S., as president of the Union for 1905, was confirmed.

The members had tea together at the Grand Central Hotel, after which they met in the Lecture Theatre at the Museum, to hear Mr. A. H. Pawson's admirable presidential address, which appears on another page. During the delivery of this the chair was occupied by Mr. H. C. Marsh, who made some interesting remarks on the value of Field Clubs.

After the delivery of the address a conversazione was held in the Museum and adjoining rooms, by the invitation of the Leeds Naturalists' Club, Geological Association, Co-operative Field Club, and Conchological Club. Messrs. Godfrey Bingley and C. B. Howdill exhibited a series of geological and architectural photographs by the aid of the lantern. Amongst the special exhibits arranged for the meeting were the following:—Experiments with Radium and other Radioactive Substances, by Mr. F. W. Branson; Coleoptera, by Mr. H. Ostheide; 'Phasmidæ' (insects protected by their resemblance), by Messrs. J. Waddington and A. Hodgson; Exotic Butterflies, by Messrs. H. C. Marsh and P. Kitchen; British Butterflies, by Mr. S. W. Judge; British Butterflies and Moths (showing Life Histories), by Mr. G. B. Stanger; Butterflies, by Mr. J. Grassham; Water Glass Weeds, by Messrs. Wm. Wallace and J. Hemborough; Group of Lions and Ornithological Specimens, by Mr. A. White; Stereoscopic Slides of Yorkshire Nests and Birds, and Wild Flowers, by Mr. Riley Fortune; Land and Fresh Water Shells, by Messrs. J. W. Taylor, W. Harrison Hutton, J. E. Crowther, and T. Castle; Selection from Hough's American Woods; Cases illustrating the Dispersal of Seeds; One Vol. of Nicholson's 'Herbarium,' by Mr. S. Margerison; Specimens of Typical Trees and Timber, by Dr. W. G. Smith and Mr. J. G. Wilkinson; Local Coal Plants, by Mr. J. W. Bond; Microscopy, Messrs. W. G. Smith, Wm. West, F. A. Mason, and C. A. Cheetham; Illustrations of Old Leeds, by the Thoresby Society, per Mr. B. P. Scattergood, M.A.; Lantern Slides in Frames, by Messrs. A. R. Dwerryhouse, W. Parsons, and Godfrey Bingley; Latest Maps (colour-printed) of the Geological Survey, exhibited by the University of Leeds: Polished Agates, by Mr. Albert Thornes; Geological Photograph Albums, by the Yorkshire

Naturalists' Union; Model of Cleveland to show Glacier Lakes, by Professor P. F. Kendall; Model of Ingleborough and Working Model of Air-Lift Pump, by Mr. A. R. Derryhouse.

Refreshments were also provided by the Leeds Societies. The entire meeting was of a most successful character, and every possible effort appeared to have been made by our Leeds friends to ensure this. The business meetings also were of a most encouraging character, and unquestionably augured well for the future career of the Yorkshire Naturalists' Union.

T. S.

NOTES ON GOOD KING HENRY.

ARTHUR BENNETT, F.L.S.,

Croydon.

MR. WALTER JOHNSON'S interesting paper on *Chenopodium Bonus-Henricus* Linn. shows how much there is yet to search out and learn about our plants.

With regard to Surrey, it used a few years ago to grow by the roadside for some 100 yards on the ascent of Slyne's Hill, between Warlingham and Woldingham, near Croydon, below a farmyard. This year I have seen three or four plants of it at Chelsham, near Croydon, most certainly only recently come there. The station given by Brewer, 'Battersea Fields,' was taken from the Flora Metropolitana of Cooper, 1837, who gives a list of 350 species as occurring there, many weeds of cultivation, but also including such species as *Teesdalia nudicaulis* and *Ophioglossum vulgatum*.

With regard to East Anglian counties there are for Norfolk 13 stations, and I have seen it at Yarmouth; Suffolk, 'frequent in all the (5) districts; '* Essex† 24 stations, Cambridge‡ 22 stations, Hertfordshire|| 34 stations. In the first four counties I have tramped over many parts of all of them, but have rarely seen it, and then by farmyards, etc. In thirteen of the southern counties in which I have seen the plant growing I should say 'not native.' The majority of County Floras say 'not native,' or it is queried.

*Dr. Hind, Fl. Suffolk, 294, 1889.

†G. S. Gilson, Fl. Essex, 261, 1862.

‡Babington, Fl. Camb., 197, 1860.

||Pryor, Fl. Herts, 348, 1887.

Beyond the distribution given by Mr. Johnson it occurs in West Sutherland (Grant sp.), West Ross, and Caithness.

In the Coll. for a Flora of Moray (1829) the local name of 'Smeardock' is given, in allusion, I suppose, to the unctuous or greasy appearance of the leaves. Alcock, in his Botanical names for English readers, 1876, says 'Fuchs includes Good Henry in his chapter on *Lapathum dock*, of which he gives four kinds, this being the third. The Germans have also the name böse Heinrick (Wicked Henry) for Dog's Mercury.'

The only name I have ever heard given to it by country people was 'Fat Hen.'

In Perthshire it grows up to 1,000 ft. altitude, and 'one plant was found on Craig Moor, in Glen Tilt, growing close to *Veronica saxatilis* and *Dryas* (W. Barclay).*

Watson gives 1,200 ft. in Tyne Province (i.e., 400 yards in Teesdale, Baker and Tate, Fl. Northumberland and Durham, 228, 1868).

For the way such plants are conveyed to their altitudes a paper by Mr. Symers M. Macvicar in the Ann. Scottish Nat. History, 176-187, 1896, may be consulted; it is too long to extract the means he gives in West Inverness, in a part of the country where then there were no railways.

Some of these local names are very difficult to trace. I have long tried to find some explanation for a name given to the fruits of *Hippophæ rhamnoides* L. by the natives of Winterton, in Norfolk, i.e., 'Wye-bibbles.'

If any reader of 'The Naturalist' can suggest any derivation of this name I shall be glad.

* 'Flora of Perth,' 255, 1898.

FLOWERING PLANTS.

***Gentiana baltica* and *Crepis biennis* in South Lancashire.**—I gathered some gentians among the damp dune hollows at Southport in September 1903. Mr. G. C. Druce, M.A., F.L.S., names these *Gentiana baltica*, and states that he has also found it in this locality. (I should be pleased to receive specimens of *G. campestris* from inland stations: I regard this as a plant frequently misrecorded.) A species of *Crepis* which I have this summer found sparingly in arable fields along the north bank of the Mersey Mr. Druce names *Crepis biennis*.—C. E. Moss, Didsbury, Manchester.

NATURE STUDY: IDEAL AND REAL.

THE third Annual Exhibition and Conference in connection with the East Riding Nature Study Committee was held at Filey on Saturday, 29th October. The exhibition was opened by Mr. Luke White, M.P., who, together with Canon Nolloth, the President of the Committee, spoke highly of the advantage of Nature Study, particularly in our schools. It is in connection with the furtherance of the teaching of Nature to scholars that the Committee is in existence. It is largely composed of teachers, supported by a few well-known local naturalists. Its object is to a certain extent attained by the holding of an annual exhibition and conference, and by field excursions in different parts of the riding during the summer months. At these all the teachers in the district are invited, and the attendances are most encouraging. It is obvious that the teacher must have a taste for natural history before it is possible to impart it to the scholars. Although the East Riding Committee, which appears to be one of the first of its kind, is quite unofficial, it has the sympathy of the local Education Committee, and hopes to have its support in a practical form—a support it certainly deserves.

At the inaugural meeting of this Committee, Professor Miall gave an address which (though, of course, not intentionally) acted as a 'wet blanket,' and almost resulted in the death of the Committee and its work. The collection and exhibition of plants, shells, etc., was strongly objected to, and stress was laid upon the necessity of each scholar having a living specimen for examination. For this purpose common objects should be used, and carefully examined by each pupil. For example, in a lesson on the Daisy each pupil should have a specimen—should examine, dissect, and describe it himself. This is all very well so far as it goes; but supposing the lesson were on the Elephant or the Whale, it might be just a little inconvenient to let each scholar have a specimen! Yet, in the absence of specimens, it would surely not be contended that lessons on such subjects should not be given? Similarly, the plants shown at that exhibition—collected, pressed, and, to a large extent, identified by school children—were described as valueless, and worse than useless, because they were *dead*. But we submit that many most important lessons could be given, and are being given, from precisely similar specimens. At one village school, not many miles from the place where that address was given, the

whole aspect of the scholars' life has changed—certainly for the better—since the teacher and a few friends instructed the pupils in the plants, etc., of their district. Their journeys to and from school are now both a pleasure and a profit to them; and the school collection, though of pressed plants and dead specimens, is unquestionable evidence of the good that has been done. We are also assured that the training given by these observational lessons has given the scholars a much keener interest in their whole work; they are much happier, their spare time is largely occupied in a much better way than was previously the case, and (what will appeal to teachers, at any rate) the attendance at school has improved.

The above remarks are suggested by a perusal of Professor Miall's recently published work,* in which many of his views, given verbally at Beverley, are put into type, together with others, which, as the author anticipates, will not meet with the approval of all his fellow-workers. This volume contains a collection of excellent 'short nature studies,' put together without any apparent arrangement, and including here and there chapters on 'Natural History Clubs,' 'The Natural History Excursion,' 'Museums and their Teaching of Elementary Natural History,' etc., in which the author's somewhat extreme views are put forward. It is perhaps in the chapter on 'Natural History Clubs' that we get the most surprises. The Professor tells us that he has belonged to many natural history clubs, but has found hardly any of them profitable. He therefore gives the following advice, presumably with the object of making such clubs profitable:—'Let no papers be read to the club.' 'Let there be no lectures, as a rule.' 'Let no local lists be prepared, read, or printed; they are hardly ever worth the paper they are printed on.' 'It is nearly always a mistake for an amateur club to print anything, even an annual report.' With these remarks we most emphatically disagree, and can only hope that they are based on the experience the Professor has had with the Natural History Club at the University of Leeds, which 'asks only for a shilling subscription, which is entirely (!) spent on refreshments. We have no constitution; we have only two officers, and we never print a line.' The *modus operandi* of this ideal Natural History Society is described in detail, and we learn that 'the discussion is preceded by a cup of tea and half-an-hour's chat.'

* 'House, Garden, and Field,' by Professor L. C. Miall, F.R.S. Edward Arnold, 1904. 6s.

With a fair knowledge of the work of natural history societies we can safely say that probably all the thirty-three societies affiliated with the Yorkshire Naturalists' Union, and the Union itself, would come to an abrupt and untimely end were the Professor's advice acted upon. But we must remember that the *real* natural history society is not composed of college students taking a course in biology principally for the purpose of obtaining a degree. It is composed of men—largely artisans, who love Nature for Nature's sake, men who are as pleased to see the birds and flowers and insects in their native haunts, to observe their habits, and to leave them unmolested, as is the author of 'House, Garden, and Field,' or anyone else. Of course there are black sheep in every flock, and it cannot be denied that there are some individuals (but we are convinced that they are few in number) who do more harm than good in their zeal for adding rare specimens to their cabinets. But such individuals would exist in spite of either natural history societies or colleges, and would probably do more harm than they do if they were entirely independent of their brother naturalists. We have recently been scrutinising very closely the work of our field clubs, and are satisfied that they are doing good in *preserving* the fauna and flora of their respective districts, and in almost every instance discourage anything that would lead to the extermination of any rare animal or plant.

The advice that 'no local lists be prepared, read, or printed,' can surely not have been given seriously, and the statement that 'they are hardly ever worth the paper they are printed on' is simply absurd. Neither do we agree that 'it is nearly always a mistake for an amateur club to print anything, even an annual report!' If there is any probability of the publications being continuous, print by all means—and in any case no harm can possibly accrue from printing a short annual report. Some of our local field clubs publish material of unquestionable scientific value—recognised as such even by our leading professors*—and the annual reports frequently contain particulars of local occurrences and records which would otherwise be irretrievably lost. If no publication is issued—if no record is made—much useful material is in a few years entirely forgotten. What will the ideal society at the Leeds University have to show in a few years' time as a result of its existence? Beyond possibly a few

*See 'Integration in Science' (presidential address to the Yorkshire Naturalists' Union), by Sir Michael Foster, K.C.B., etc. 'The Naturalist,' July 1899, pp. 200-223.

receipts for tea and biscuits, nothing—absolutely nothing. In fact, in our humble opinion this society has no claim to its title, and should be looked upon as part of the class in biology—of the students of which we presume it will be largely, if not entirely, composed.

Whilst we welcome 'House, Garden, and Field,' and recommend all naturalists to read the charming essays on various biological subjects, we cannot agree with some of the opinions expressed therein, which it must be remembered are those of a Professor of Biology, and cannot be accepted as those of a field naturalist.

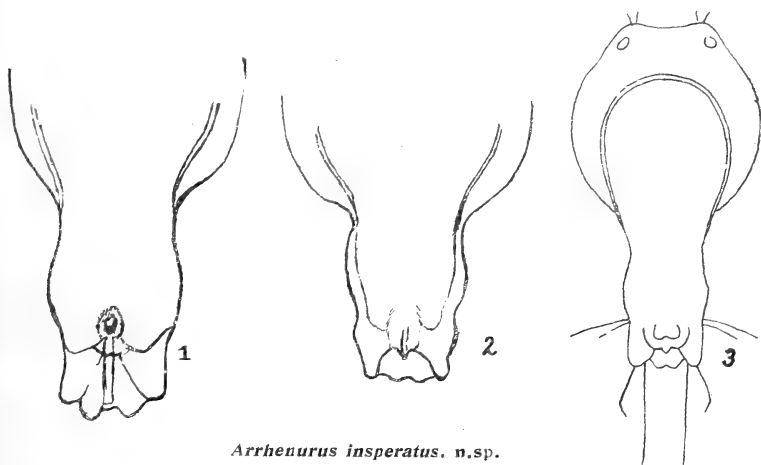
T. S.

LINCOLNSHIRE FRESHWATER MITES.

C. F. GEORGE, M.R.C.S.,

Kirton-in-Lindsey, Lincolnshire.

Arrhenurus insperatus n.sp. This mite (Fig. 3) belongs to Thon's division *Megalurus*, and is indeed very nearly allied to *A. caudatus*, being very similar in size and colour to that mite; it, however, differs greatly in the general contour, and markings



of the appendix, or tail, as an examination of Figs. 1 and 2 will make evident; both figures are drawn to the same scale, and under the same objective and eyepiece. Fig. 1 is from a specimen of *A. caudatus*, and Fig. 2 is from *A. insperatus*. Each specimen is mounted in Canada balsam. In Fig. 1,

tracing the contour line, commencing at the narrowest point below the body and going downwards, the line gradually swells outwards and then inwards, forming a convexity. It next forms a shallow concavity, and expanding slightly forms the rounded external corner of the tail; again passing downwards and inwards towards the central line, it forms a bold rounded projection, and ends in a deep notch in the central line of the tail end; the other side and half the end is formed in the same manner. Tracing the outline in the same way in Fig. 2, it will be observed that after the first convexity there is another and smaller one before the external corner of the tail is reached; the end contour line of the tail also crosses directly from one side to the other in a wavy line, the convexities and concavities being much less marked than in Fig. 1, the central notch being comparatively shallow. Also the markings on the surface of the tail of the two mites are not alike. I am of opinion that this is a new and undescribed species, and have given it the name *insperatus*, i.e., the unexpected.

I also wish to add to my list of Lincolnshire Hydrachindæ—*Arrhenurus nodosus* Kœnike and *A. stecki* Kœnike.

YORKSHIRE EARTHQUAKES.

CHARLES DAVISON, Sc.D., F.G.S.,

Birmingham.

DURING the last 16 years I have been engaged in studying the earthquakes of England, the results of my work being contained in papers published in the 'Quarterly Journal of the Geological Society,' the 'Geological Magazine,' and in my report on the 'Hereford Earthquake of 17th December 1896.' I propose now to carry the work backwards so as to prepare as complete a history of British earthquakes as may be possible at the present day. To do this at all satisfactorily is of course beyond the powers of one man. It requires access to the files of local newspapers. Records of past shocks may be preserved in private journals, and not a few are to be found in the pages of county histories or local magazines. These sources are for the most part inaccessible to all but their owners, and it is therefore only by the kindly aid of others that the necessary materials can be procured. If any readers of 'The Naturalist' should be able and willing to contribute records either from the sources

mentioned above or from their own recollection, of earthquakes felt in any part of the country, but especially in Yorkshire, such help would, I need hardly say, be of the very greatest service.

Except in the West Riding, and especially in the district bordering on Lancashire, earthquakes are comparatively rare in Yorkshire. The following is a list of those known to me since the beginning of the 19th century, dates printed in italics being those of earthquakes which were probably sensible in the county, but of which I possess no actual records:—

RIDING UNKNOWN.—20th March 1822, 16th and 17th March 1869, 22nd March 1871.

EAST RIDING.—30th April 1818, *17th March 1843, 9th Nov. 1852*, 6th Oct. 1863, 15th March 1869, 18th June 1885, 17th Dec. 1896, 24th March 1903, and 3rd July 1904.

NORTH RIDING.—*17th March 1843, 9th Nov. 1852*, 6th Oct. 1863, 17th March 1871, 23rd Sep. 1875, 25th June 1890, 17th Dec. 1896, 24 March 1903, and 3rd July 1904.

WEST RIDING.—17th March 1816, 9th Nov. 1817, 9th Feb. and — 1827, 12th July 1834, *10th and 17th March 1843*, 9th Nov. 1852, 15th Dec. 1859, — *1861*, 6th Oct. 1863, 26th Sep. 1864, *30th Oct. 1868*, 15th March 1869, 17th March 1871, 4th Jan. 1872, 29th and 30th April 1873, 27th April 1874, 23rd and 25th Sep. 1875, *22nd April 1884*, 18th June 1885, 15th Sep. 1886, 10th Feb. 1889, 25th and 26th June 1890, 17th Dec. 1896, 24th March 1903, and 3rd July 1904.

Notes about any of the above earthquakes, except perhaps the last three, would be most useful for the purpose which I have in view; but I should be especially glad to receive accounts of those which occurred on 17th March 1843, 9th Nov. 1852, 6th Oct. 1863, 30th Oct. 1868, 15th March 1869, 17th March 1871, and 22nd April 1884. Notices of the effects of the great Lisbon earthquake of 1755, if any such were observed, would also be of considerable interest.

The points on which I desire most to obtain information are indicated in the appended questions. I may add that I shall be glad to send printed copies of these questions to anyone who may be able and willing to give, to however slight an extent, the valuable assistance indicated in this note.

QUESTIONS.

- 1.—Place of observation.
- 2.—Condition of observer when the earthquake began, (a) indoors or outside, (b) awake or asleep.

- 3.—Time of occurrence.
- 4.—(a) Nature of the shock. (b) Did it consist of two distinct parts, separated by a brief interval of rest and quiet? (c) If so, which part was the stronger and how long was the interval between them?
- 5.—Was the shock strong enough: (a) to make doors, windows, etc., rattle: (b) to cause the observer's seat to be perceptibly raised or moved; (c) to make pictures, chandeliers, etc., swing; (d) to overthrow ornaments, vases, etc.; (e) to throw down chimneys or crack the walls of buildings?
- 6.—Was any unusual sound heard and what did it resemble?
- 7.—Were any slight shocks felt before or after the principal earthquake; if so, at what time, etc.?

FIELD NOTES.

BIRDS.

Goldfinch at Tanfield.—On Saturday last I saw two hen Goldfinches feeding on a thistle plant at Tanfield Station. I have not seen any of these birds in this district for the last year or two.—R. T. SUMMERFIELD. Ripon, 22nd Nov. 1904.

LEPIDOPTERA.

***Hadena protea* at Newsome.**—I captured a specimen of this rather scarce Yorkshire moth at rest in our garden at Newsome on the 4th August 1903. My capture remained unnamed until recently, when identification was established for me by Mr. S. L. Mosley, F.E.S.—W. E. L. WATTAM, Huddersfield.

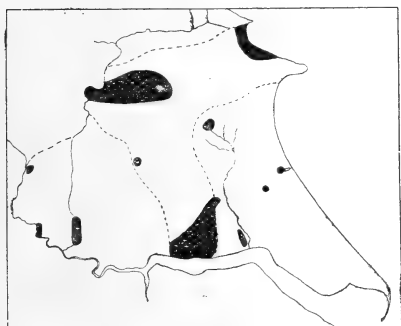
ORTHOPTERA.

***Panchlora exoleta* Klug. in Yorkshire.**—Referring to Mr. Porritt's note ('The Naturalist,' 1904, p. 347), a specimen was taken in Bradford a few weeks ago and kindly given me by Mr. Jowett, and another was sent to me alive for identification by Mr. G. W. Brown, of Bradford, who gave me the specimen, which is a fine and perfect one. It was picked up in Leeds on the 9th inst.—J. W. CARTER, Bradford, 19th December 1904.

REVIEWS AND BOOK NOTICES.

Published Records of the Land and Freshwater Mollusca of the East Riding, with additions.* T. Petch, B.A., B.Sc.

The issues year by year of the Transactions of the Hull Scientific and Field Naturalists' Club have been timely, able, and well up to date. The work of the club in its Field department has been most persevering, and during a long series of years excellent work has been done. The results of these labours and a series of papers on East Riding topics have been issued from time to time under the able editorship of Mr. Sheppard. Vol. II., 'The Flora of the East Riding,' by Mr. J. F. Robinson, is now a standard work on the distribution of the Flora in that Riding, and will be the basis of all future work. We have here a similar and much wanted work on



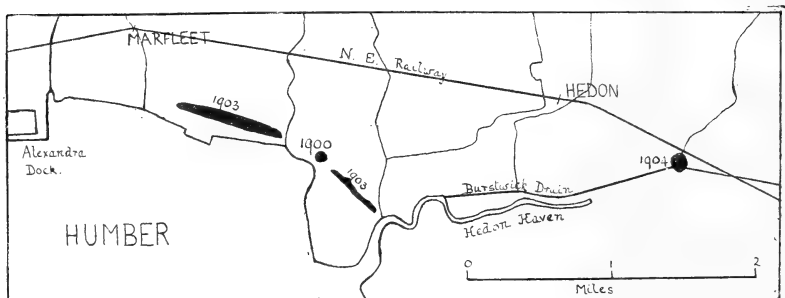
Distribution of *Helix arbustorum*.

mollusca from the pen of Mr. T. Petch, a well-known and one of the most indefatigable and accurate workers of the district. The writer has most carefully and exhaustively examined all available records and has brought together in small compass all the information gleaned therefrom in this interesting monograph. One fact it un-

consciously brings out, viz., that the bulk of the investigation of the various areas has been done by members of the Yorkshire Naturalists' Union and the Hull Club. The tables are excellent and the summary of results is suggestive. The monograph also directly and indirectly calls attention not only to what has been done but also what still waits to be accomplished; for example, the northern and central portions of Derwentland have been practically unworked, and final conclusions as to the fauna of that part of the district cannot be come to. The same applies to the central northern parts of the Wolds section, especially the northern and western slopes. Within the last year special attention has been given to the neighbourhood of Tibthorpe-on-the-Wolds, with results that have far exceeded all expectations.

* A. Brown & Sons, Ltd., Hull. 1s. 6d. net.

Similar results we may expect from further investigation elsewhere. The monograph is valuable also as giving a summary of results under the heading of nearly each species. The plates showing the distribution of several of the species are specially interesting. The sketch showing the spread of the distribution of *Paludestrina jenkinsii* during several years is excellent. The



Distribution of *Paludestrina jenkinsii*.

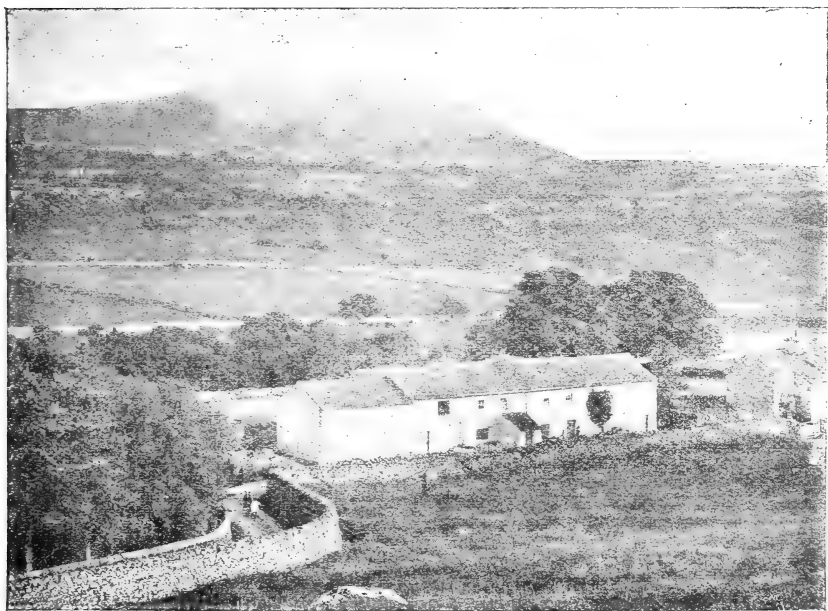
deductions in one or two instances are open to question, but they form a valuable basis for the treatment of the individual species in relation to effect of food, soil, climatic conditions, and extension of area of distribution. Reference is made to the maps of the Flora and Geology of the East Riding in Vol. 2 of the Transactions. It would have added to the value of the monograph if that could have been included, as the question of soil is an important factor in the distribution. The maps appear to be generally accurate, but Plate XII., *Helix arbustorum*, shows on the Holderness side, near Driffeld, an area of distribution which should have been well to the left of the line of demarcation of the Wolds area, as Sledmere is well over the line. The Driffeld records should be for the Wold part of the Driffeld district nearer Sledmere. The streams should have been carried over the line, as they go beyond Driffeld, which is on the line. We congratulate Mr. Petch on his able monograph and would heartily recommend it to all who would know about the East Riding Fauna. It is considered the prerogative of a reviewer to indulge in a grumble. We confess that we are surprised to find that the older nomenclature has been adhered to in preference to that of the new List of British Non-Marine Mollusca prepared by the Conchological Society and finally issued in 1904. We know that doctors differ, and scientists more so, and certainly one gets very tired of the constant change in name; but the new list is after all the latest authorised

list of the Conchological Society. It would have been a great convenience to have had the new names inserted if only as second names. Each worker will have now to annotate his copy for himself.

E. P. B.

The British Isles. By J. B. Reynolds, B.A. 1904. 128 pp. Adam & Charles Black, London.

This book is one of the finest of its kind, and at the same time one of the cheapest, that we have had the pleasure of seeing. Though written essentially for the teaching of geography, it contains much information of interest to the general reader, and the wealth of beautiful illustrations and



Ingleborough.

maps (about 90 in all) make it particularly attractive. Amongst these, Yorkshire naturally takes a prominent part. A view of Ingleborough, showing the characteristic stone walls, we are permitted to reproduce.

No. 2 (October) of the 'Bradford Scientific Journal' is a great improvement upon the first, and is much more local in character. Mr. W. Cudworth has a well-illustrated paper on 'The Romans at Ilkley'; Mr. E. E. Gregory has 'Observations on the Glacial Geology of the Settle District,' and Mr. H. B. Muff gives a useful 'List of Works on Airedale Geology.' Other notes are 'The Psychology of the West Riding Personality,' 'The Ring Ouzel,' by W. H. Parkin, 'Pond Life,' by W. West, 'Spiders,' by F. Rhodes, and shorter notes of local interest. We presume 'The Atmospheres of the Planets,' and 'On the Zig-Zag form of Long Sparks,' etc., have been included as 'filling.'

NORTHERN NEWS.

A litter of black foxes has recently been observed at Bedale.

A Hooded Crow and a Hoopoe have recently been shot in Cheshire ('Zoologist' for November).

Mr. A. Smith records a Little Owl at Humberstone, North-east Lincolnshire ('Nature Study,' December).

A specimen of Leach's Fork-tailed Petrel was taken in an exhausted condition in Hyde Park, Leeds, in November.

Examples of the Levantine and Sooty Shearwater have recently been shot near Scarborough, and are recorded in the 'Field.'

Mr. W. H. Pickering, formerly Chief Inspector for the Yorkshire and Lincolnshire Mining districts, has been appointed Chief Inspector of Mines in India.

In 'Man' for December, Dr. W. Wright, who has recently made a careful examination of the skulls in the Driffield Museum, describes a useful skull-stand for photographic purposes.

Mr. Oxley Grabham has been appointed keeper of the Museum at York. Mr. H. M. Platnauer has not severed his connection with that institution, though such report was erroneously given in the press.

The Advisory Committee of the Botanical Garden, Bradford, report various valuable additions during the year. Full advantage of the garden has been taken by teachers, and lecturettes have been delivered.

Under the will of the late Mr. Emanuel Mirfield, of Bradford, who died in November last, the Bradford Scientific Association has received the bequest of £20 clear of duty, and some valuable scientific apparatus.

At a recent meeting of the Lancashire and Cheshire Entomological Society specimens of *Leucophaea surinamensis*, an exotic cockroach, were exhibited, which had been found breeding amongst turf at Fallowfield, Manchester.

At the annual meeting of the Lincolnshire Naturalists' Union, held at Lincoln, several changes in the officers took place. The Rev. E. A. Woodruffe-Peacock, who has been the Hon. Secretary so long, was elected President, his place being taken by Mr. A. Smith, of Grimsby. Mr. F. M. Burton asked to be relieved of his duties as treasurer, and his place was taken by Mr. J. S. Sneath, of Lincoln.

The annual meeting of the Leeds Conchological Club was held in Leeds on 3rd December. During the year eleven meetings were held, six being in the field for the inspection of the habitats of the more interesting mollusca. Mr. A. H. Pawson, J.P., was elected President for 1905, and Messrs. F. Booth and J. E. Crowther were re-elected Secretaries. The club appears to be in a flourishing condition.

The recent appointment of Mr. T. Petch, B.Sc., B.A., of Hedon, as Mycologist to the Government of Ceylon, removes from our midst one of Yorkshire's most promising naturalists. Whether studying bird life, marine zoology, the mollusca, or the lower fungi, Mr. Petch is equally at home, and in each of these branches of natural history he has done incalculable service. To the Yorkshire Naturalists' Union and its committees Mr. Petch was a most useful worker, and he has contributed several valuable papers to the 'Naturalist.' The Hull Scientific and Field Naturalists' Club, however, will miss him the most, for which he has done so much, not only in original research, but in encouraging others. This club has just published his valuable paper on 'The Land and Fresh Water Mollusca of East Yorkshire.' Whilst all northern naturalists will regret that Mr. Petch is leaving the district, all will wish him success in his new sphere, and hope for the day when an important appointment in his mother country may lure him back again.

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PUBLICATIONS RECEIVED.

Zoologist, New Phytologist, Journal of Malacology, Nautilus, for December; Journal of Conchology, Lincolnshire Notes and Queries, Entomologist, Nature Notes, La Feuille des Jeunes Naturalistes, Annals of Scottish Natural History, Irish Naturalist, and Knowledge and Scientific News for January; Aquila, Vol. XI., 1904; Naturæ Novitates, Nos. 19-21, 1904.

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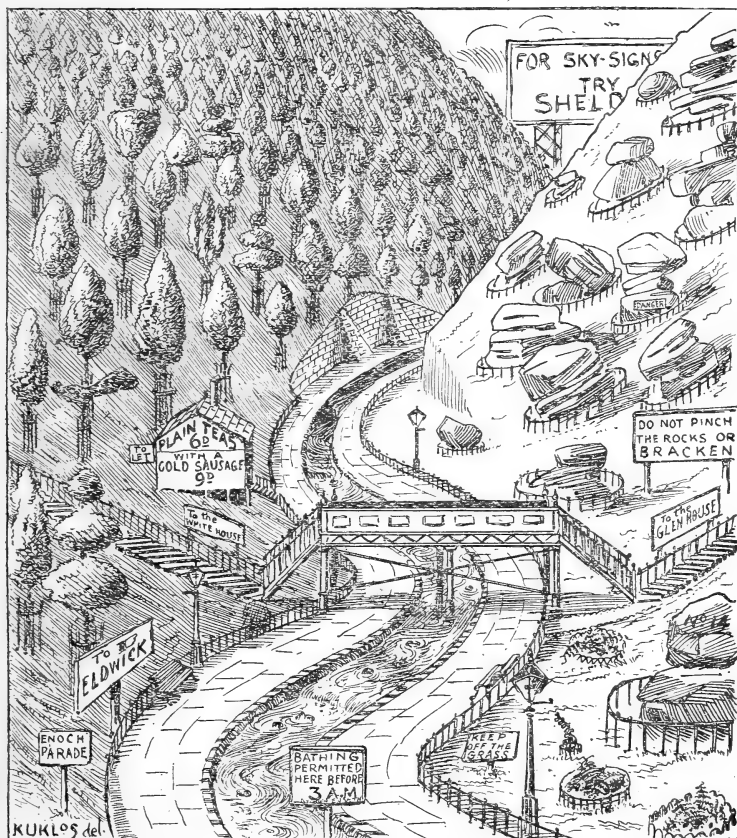
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NOTES AND COMMENTS.

SHIPLEY GLEN, BRADFORD.

The recent proposal of a committee of the Bradford Corporation to 'improve' Shipley Glen by making paths on either

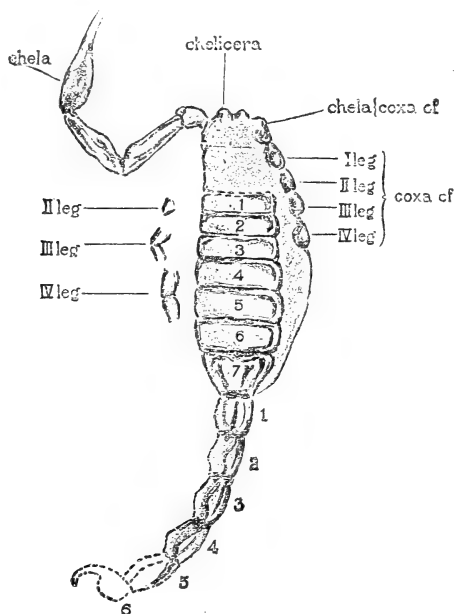


side of the stream, in order to find work for the unemployed, very naturally resulted in an outcry from those interested in the preservation of natural scenery. To have spoilt this beautiful natural glen would have been a serious loss not only to the present but to the future inhabitants of Bradford. Whether as a result of the expressed indignation or not, it is satisfactory to learn that Shipley Glen, for the present at any rate, is to remain in its natural state. The Bradford 'Jackdaw' joined in the campaign and gave a sketch of the probable appearance of the glen when

the council have 'finished' it! This we are permitted to reproduce herewith.

A COAL-MEASURE SCORPION.

In the Quarterly Journal of the Geological Society, recently issued,* Messrs. W. Baldwin and W. H. Sutcliffe describe a new species of scorpion, found in a nodule at Sparth Bottoms, near Rochdale. This occurred in the Middle Coal Measures, at



Eoscorpius sparthensis (natural size).

the same horizon as *Belinurus bellulus*, described in these columns in February 1904. To the new specimen the name of *Eoscorpius sparthensis* has been given, and the Geological Society has kindly enabled us to give the illustration of the specimen.

THE GOWBARROW ESTATE.

All naturalists will appreciate the efforts of the National Trust to secure the Gowbarrow estate, on the banks of Ullswater, for the benefit of the nation for ever. The estate comprises 740

* November 1904.

acres, with one mile frontage to the lake, rights of fishing and boating, the deer forest, woods, and the waterfall, and can be purchased for £12,000. It is to be hoped that all who can will help the National Trust in their laudable scheme, as, through the efforts of the builder and tourist, Britain's beauty spots are



Ullswater.

yearly becoming fewer in number. An illustrated pamphlet, with a plan of the estate, will be gladly sent to any interested, by the Secretary of the Trust, 25, Victoria Street, Westminster, who will also be glad to receive subscriptions.

EARTHQUAKE AT HESSLE.

In an article on 'Some Minor British Earthquakes' in a recent issue of the 'Geological Magazine,' Dr. C. Davison gives particulars of an earthquake at Hessle, on 13th April 1902, which is probably but little known. The shock 'consisted of a single series of vibrations, increasing in intensity to a maximum and then dying away. The average duration of the shock was about four seconds.' We learn that the shock

occurred on a Sunday during the morning service, which may account for it not being noticed by the local geologists! Dr. Davison suggests that the direction of the originating fault

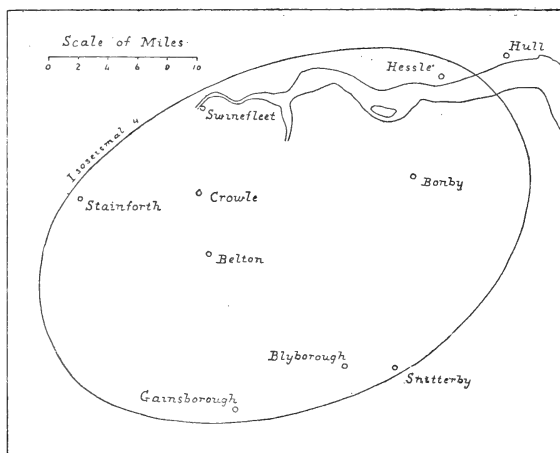


Diagram Map of the Hessle Earthquake, 13th April 1902.

was probably about E.N.E. by W.S.W. We are indebted to Dr. H. Woodward for permission to reproduce the block.

MOLLUSCA.

North Lincolnshire Mollusca.—While out in Newstead parish, near Brigg, on the 9th January, my son Dennis and his cousin, Tom Warner, took a dead *Anodonta cygnea* from a peaty part of the Fairway Drain. The valves are still held together by the ligament. During the fourteen years I have been here I have never seen this species living or dead. I have known its habitats all my life, and it seems curious I have failed to find it.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg.

North Lincolnshire Mollusca.—While collecting broken shells from Thrush Stones to-day (11th January 1905), we took two unusual forms, *rubella* 12045 and *olivacea* 12045. I have only found the third band wanting thrice before in Lincolnshire. The form 12300 I have never met with. Has anyone in Britain? To-day's most curious find was one specimen of *rubella* (12345), creeping about as if it were mid-summer on the bank of North Kilsey drain.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg.

Naturalist,

NOTES ON THE BATS NEAR BARNSELY.

JOS. ARMITAGE.

IN any locality in Yorkshire possessing an abundance of fine old oak and beech trees, with a few ruined buildings and sheets of water in their midst, there will no doubt be found a few of the species of Bats which occur in the county. Such is the Stainborough locality, near Barnsley, where, during the last five years, my friend Mr. A. Whitaker and I, have taken seven of the eight species which have so far been recorded for Yorkshire, viz., Noctule (*Vesperugo noctula*), Pipistrelle (*V. pipistrellus*), Hairy-armed (*V. leisleri*), Long-eared (*Plecotus auritus*), Reddish-grey (*Vespertilio nattereri*), Daubenton's (*V. daubentoni*), Whiskered (*V. mystacinus*), and the remaining species, the Lesser Horseshoe Bat (*Rhinolophus hipposideros*) may be obtained in the district eventually. Of these *Vesperugo noctula*, *V. pipistrellus*, *Plecotus auritus*, and *Vespertilio nattereri* occur plentifully, and though the latter had only been recorded twice until the year 1900, it has since been seen and obtained a great many times here, so that it cannot now be classed as a rare Yorkshire Bat.

Only a few examples of the other three species have been obtained, the rarest as yet being *Vespertilio daubentoni*, of which only two examples have been taken, the first in April 1901, and the second in October 1904. Though this species has seldom been recorded for the county, I do not think it is uncommon in this particular locality, as a number of Bats answering its description in size, flight, and habits were often seen during the summer of 1904 flying over a sheet of water only a short distance from an old disused tunnel, where the two specimens were procured, and though Bats are admittedly somewhat difficult to distinguish when flying, I feel sure that these were *V. daubentoni*.

Four specimens of *V. mystacinus* have been obtained; the first, a rather small one, was found clinging to the outer wall of an old building during a bright, warm day in April 1901, and had apparently only just awakened from its winter sleep and come from its hiding-place. *Vesperugo leisleri*, another species with very few Yorkshire records, has occurred four times. The first one, obtained in March 1903, I put in a solution of formalin and labelled it *V. noctula*, thinking at the time that it was only a small dark specimen, but in May 1904 one of the

Stainborough woodmen gave me three Bats which he had taken from a hole in a tree, and upon examination they proved to be similar to this one. Being then uncertain of their identity I sent one, along with the first taken and a specimen of *Vespertilio daubentoni*—about which I was also uncertain—to Mr. Oldfield Thomas (British Museum), who kindly named them for me as undoubted examples of *Vesperugo leisleri* and *Vespertilio daubentoni*.

From the holes and crevices in the roof of the tunnel previously mentioned a great many Bats have been obtained at various times, and it is here that most of the *V. nattereri* have been taken, whilst two of the four *V. mystacinus* and the only two *V. daubentoni* were also obtained here. In this place Bats may be searched for during almost any month of the year, but summer and autumn are the periods when most are to be found, as during these months a few are often to be found at rest in the daytime hanging between the loose stones in the roof, and with the aid of a lighted candle fastened to the end of a walking stick they are not very difficult to find. In winter they are not so easy to get, as they retire further into the crevices, where it is impossible to see them, and fall into a torpid sleep. Their sleep, however, is very intermittent, and a period of damp or frosty weather seems to disturb them, and they will then move short distances among the stones in search of more comfortable quarters. It is after they have been so disturbed that specimens have occasionally been obtained in the depth of winter.

Short tunnels, however, are not the only places where Bats may be found, as some species will rest in a variety of situations, and to give a list of the places where I have found *P. auritus* and *Vesperugo pipistrellus* would take up far too much space, but among others which could be mentioned are : holes in trees, under loose bark, behind ivy, among the thatching over an old shed, and holes and crevices in almost any old buildings. *V. noctula*, on the other hand, is a species particularly fond of resting in hollow trees—in fact, I have never found them in any other situation, and though their retreat is often extremely well concealed in some old tree, it is frequently betrayed by the noisy quarrelling of the occupants, who, as a rule, seem to be incapable of agreeing with each other, even when only a few are sharing the same hollow.

As the Stainborough surroundings appear to be very attractive to Bats, it is not surprising that some species are extremely common, and one, *Vespertilio nattereri*—a Bat considered rare

in Yorkshire until a few years ago—has been taken fairly plentifully, my friend and I having handled at least sixty specimens, which have been procured either singly or in small numbers. I have never yet been fortunate enough to find a large colony of any kind, the most I have yet seen together being just over twenty *Noctules*, and these were on the point of leaving the hole in which they had spent the winter when I was attracted by their cries and discovered their hiding-place in a large beech tree.

Always rather difficult of observation, and looked upon by most people as very mysterious creatures indeed, Bats are most interesting animals to study, either in a state of nature or in captivity. A Long-eared Bat which I have kept some months shows no signs of sleeping during the winter, but every night runs nimbly over the gauze around his cage and awaits the time for feeding. He will eat flies, moths, pupa and beef cut very small, but mealworms constitute his staple food, and upon them he chiefly subsists. What the capacity of his stomach may be I cannot tell, but he is certainly possessed of a good stomach and a good appetite, as the devouring of twenty mealworms in a short time is apparently very little trouble, after which he will fly swiftly round the room, occasionally resting and cleaning himself, and on the whole gives one the impression that he has spent a most enjoyable night.

LEPIDOPTERA.

***Hadena adusta* in Middlesbrough.**—When sugaring in Kensington Road, on 4th July last, I obtained a fine female of this moth which had only once before been noticed in Cleveland, at Kildale. It laid eggs, which have been successfully reared to the pupa state.—FRANK ELGEE, Middlesbrough.

COLEOPTERA.

***Hylesinus crinatus* in West Yorkshire.**—While searching in the neighbourhood of Cawthorne, near Barnsley, recently, I came across an old ash tree swarming with this beetle. The tree is dead, and, I have no doubt, that years ago the beetles hastened its death. Since then I have found several trees near Keighley destroyed by the same beetle. I am not aware that this beetle has previously been recorded from West Yorkshire.—S. L. MOSLEY, Technical College, Huddersfield.

AN EXPOSURE OF UPPER COAL MEASURES NEAR CONISBOROUGH.

H. CULPIN AND G. GRACE, B.Sc.

IN the construction of the Dearne Valley Railway a recently-made cutting near Conisborough has exposed a series of clays and sandstones underlying the Permian.

Among them there occurs a thin band of soft ironstone about 2 in. thick full of the impressions of a bivalve shell. Prof. P. F. Kendall has submitted a specimen to Mr. H. A. Allen, of the Geological Survey, and he identifies it as *Anthracomya Phillipsi*. This has been confirmed by Dr. Wheelton Hind, who regards it as giving strong evidence that the beds belong to the Upper Coal Measures.

The discovery is interesting, as it is the first time Upper Coal Measures have been found in Yorkshire. The only other group of beds in the county regarded as belonging to them is the Red Rock of Rotherham, from which, as yet, no fossils sufficient for identification have been obtained.

The work of examining the cutting in detail is in progress, and it is hoped that sufficient evidence may be collected to place the position of the beds beyond question.

A notification of the discovery of *Anthracomya Phillipsi* has been communicated to the Yorkshire Geological and Polytechnic Society.

HYMENOPTERA.

***Mutilla europæa* at Robin Hood's Bay.**—On 1st August last I found a female specimen of this rare ant running amongst heather on the moors near Robin Hood's Bay. This makes the second record of its occurrence in Yorkshire, where it is probably commoner than is supposed. A comparison of the specimen with the figure and description given in Saunders' 'Hymenoptera Aculeata of the British Isles,' leaves no doubt whatever as to its identity. Its black head, red thorax, and black abdomen with three silvery bands, one situated near the thorax, the other two near the extremity of the insect and broken in the centre, render it an unmistakable species.—FRANK ELGEE, Middlesbrough, 31st December 1904.

Naturalist,

MOUNTAIN PLANTS AT THE SEASIDE.

A. H. PAWSON, J.P., F.L.S., F.G.S.,

Past-President, Yorkshire Naturalists' Union.

THE flora of high mountains differs in several ways from that of the lower ground. The species are naturally fewer, since not every plant of the latitude is able to endure the hardships of a mountain summit—its scanty and sterile soil, the stress of its storms, the rigour of its frosts, and the quick changes of its summer temperature. These fewer numbers are, however, quite at home in their chosen habitat, for they have arranged their manner of growth so that they feel no discomfort. They are, without exception, small plants: they do not need much nourishment. Their leaves, too, are small: they lie flat to the ground. Here grow Willows with buried branches, whose flowering twigs are not two inches high: here spreading shrubs, like the dwarf Juniper and the Alpine Bearberry, hug the ground so closely that they would hardly rise above the level of a well-kept lawn. The wind cannot lay hold of this prostrate vegetation: no weight of snow can crush it flatter. These furious elements are quite disarmed by such abject submission.

How is it, then, that these hardy plants, which can flourish thus on barren summits, do not descend somewhat to occupy more favourable ground? They remain where they are because it is the only place in which they could exist. Such pygmies would be overpowered at once by the coarser herbage which clothes the slopes below them. They are, in fact, prisoners on their heights: perhaps it would be more correct to call them refugees.

All the plants of our lofty mountains are to be found near the sea-level in higher latitudes, and I think we may say with confidence that long ages ago they also inhabited the low ground in our own country: for then an Arctic climate ruled the land: our seas were frozen and our valleys were blocked with ice.

Although in Britain the mountain-plants are all Arctic, the much higher mountain ranges of Central Europe nourish a large flora of their own: yet among these Alpine plants a good number of Arctic species are intermingled. Some of these, the Arolla Pine, for instance, and the herbaceous Willow, are to be found in the Alps and in the Arctic region, but not in the plain

or on the mountains of the district which lies between. The presumption is almost strong enough to form a conviction that once upon a time these Arctic plants flourished in all this middle region, and the geological record informs us that the necessary climatic conditions once existed there : so that it has been fairly concluded that, when the Ice Age had passed away, these few northern plants now on the Alps were driven to these inhospitable heights by the grosser flora of a warmer climate.

This comparison with the Alps enables us to theorise more confidently about our own mountain plants, and here we are not troubled with the question of the Alpine flora since ours is all Arctic. The Swiss may settle their own quarrels.

Once then, long ago, when the glaciers were grinding boulder clay and playing at bowls with erratics, a climate prevailed in this country not much dissimilar from that which now reigns on our mountain summits, and the plants were those that the climate suited. Then gradually a warmer era set in and a larger and more robust type of vegetation began to invade the lower and the richer levels and to press hard upon the aborigines, who at length could only maintain themselves in the ground least coveted.

Plants are strangely like human beings. We seem to be talking of the retreat of the Celts before the Teutons, and I would fain find another point of resemblance between our antique flora and these ancient ancestors of ours. The Britons, flying before Saxon and Dane, took refuge in the high mountains of Wales, and some of them on the flat shores of Anglesea, both remote districts uncoveted by the invaders ; and we have with us now, as remnants of this old Arctic flora, one or two plants very well known to botanists which seem to have behaved in a similar way, for they exist at present only on lofty mountains and by the sea-shore. You will search for them in vain in the land that lies between. These plants are :—*Cochlearia officinalis*, *Silene maritima*, *Armeria maritima*, and *Plantago maritima*.

I cannot find any likeness in the plants themselves which might explain their association in such different positions. No two of them are of one family, or even of the same order. The Plantain and the Thrift, both small herbs whose grass-like leaves are all radical, are the most alike, and they often grow together on the edges of sea-cliffs as turf-plants. On a muddy rocky shore the Thrift will grow down to high water mark, while on

mountains it chooses the highest, stoniest, and most innutritious soil. The *Silene* is the only true rock plant of the group. It roots in clefts and crevices of the cliffs and crags, and its habit is diffuse and pendulous. The Scurvy-grass is perhaps no more than a biennial : very few of our crucifers are of longer duration. It is always a waterside plant or a denizen of wet soil. On the mountains you will find it on dripping ledges or among the spongy growth where springs issue, associated often with *Montia fontana*, *Chrysosplenium oppositifolium*, and in choice spots with *Saxifraga stellaris*. It is often brought down by water from the heights, as its inflated seed pods lend themselves to this mode of transportation ; but it is not permanent in such situations. It is only to be found by the side of streams which have their sources in the mountains where it is at home. Such colonies are short-lived, but they are continually recruited from above.

What the Arctic plants chiefly desired was to get out of the way of the overbearing newcomers, so they climbed the mountains until they left their pursuers behind them. Is it not likely that some of them would also find an uncoveted refuge in the barren cliffs and sands of the sea-coast ?

Doubtless the climate of our mountains is better suited to Arctic plants, as a whole, than the climate of our sea-shores ; but a few of them are nowise particular about atmospheric conditions, as witnesses their occupation of Alpine heights, where the midday heat is often excessive. *Dryas octopetala*, a typical plant of the extreme north, not only inhabits the Alps but flourishes also near sea-level in Co. Clare. *Sedum rhodiola*, which in England only grows on the wet rocks of our highest mountains, which survives too in the Alps, is in the North of Scotland most at home in the moist crannies of the sea-cliffs.

Mountain plants—that is, these refugees of which we are speaking—are often grown in gardens, where it is difficult enough to provide the conditions to which they are accustomed. We can give them rockwork and proper soil, but how about the cloud-moisture, and the blanket of snow beneath which they sleep, unconscious of wind or frost, during half the year ? How shall we supply the continuous drip of the weeks when this snow is melting and they are making their growth ? Still, many of these plants will thrive fairly well on a garden rockery, if only they have their little stations all to themselves. What they cannot and will not put up with is to be crowded and jostled and bullied by bigger plants. Most of them choose

barren spots, not because they prefer them; but because they find these places unoccupied, and because they know that they will not there be troubled with undesired company.

The high mountains offered a natural retreat to these hunted Arctic plants, and they have provided them with a permanent refuge, for here both soil and climate are alike suited to them and intolerable to their enemies; but the occupation would be gradual. They would at first attempt to hold the lower heights and all waste and rocky ground, until one after another of their fortresses were isolated and surrounded and the garrisons put to the sword. Perhaps we may regard the *Dryas* on Arncliffe Clowder and the *Cornus suecica* at the Hole of Horcum as survivors of such garrisons.

It seems, however, possible that those plants which took refuge on the sea-cliffs and sea-shores might have some chance of preserving their existence. The enemy was at any rate only on one side of them. It would be a weaker enemy, too. The whole horde of the invaders would not follow them, for comparatively few plants are able to support the exposure and the briny atmosphere of the neighbourhood of the sea. It is true that the numbers of the pursued would be reduced by the climate quite as much as those of the pursuers; but is it not likely that some of these Arctic fugitives, who were not so nice about the climate, would find themselves on more equal terms with their foes, so that they would be able to make peace with them and agree to live together side by side?

This is, however, no more than a conjecture and a suggestion. The only resemblance that I can trace between mountains and the sea-coast as a home for plants, is that they are the two points of the earth where erosion and denudation are the most active; and where fresh land-surface is continually being laid bare. The crumbling cliffs, and the changing sands and mudbanks of the seashore may compare with the rock-falls, and talus-slopes, and torrent-detritus of the high mountains. Both are alike in possessing waste unoccupied ground where plant-competition is at its lowest.

TRICHOPTERA.

***Lype phæopa* in Yorkshire.**—This little trichopteron, which seems to be hitherto unrecorded for Yorkshire; I have had—taken by myself at Castle Howard—ever since June 1896.—
GEO. T. PORRITT, Huddersfield, 9th January 1905.

LINCOLNSHIRE MAMMALS.

ARTHUR SMITH, F.L.S., F.E.S.,

Grimsby.

IN 1886, the late Mr. John Cordeaux, in an article in 'The Naturalist,' said, 'Up to the present date Lincolnshire compares unfavourably with other counties in having no published list of the Mammalia found within its bounds,' and for several years I have anxiously awaited such a catalogue, but in vain.

I do not dare to hope that many more new species will be added to the present list, but authentic records of any of the species enumerated, whether common or not, would be most acceptable, for whilst some of the mammals may be common to our northern district, with which I am best acquainted, it is possible they may be of less frequent occurrence in the southern portion of the county; or, on the other hand, it may be that some species which are rarely recorded may be less rare if searched for and records sent in.

Nearly fifty species have been recorded for Lincolnshire, and no doubt as time goes on this number will be rather less than be added to. The Wild Cat, though of practically recent occurrence, is extinct now, and the fact of the Otter being so plentiful at this time may be the means of its extermination for a time, as Otter Hounds are being brought into the county to hunt the animals. Its wandering disposition, however, will keep it with us so long as there are favourable waters by which to make its abode.

An account of our pre-historic mammals would be indeed interesting, written as it should be by one acquainted with methods of deduction as to their habits and distribution, and evidences are fairly plentiful regarding the presence of many of our early mammals. In the excavation of the docks, Grimsby, *Bos primigenius* is represented by the finding of a horn core. In the peat in Aylesby parish, bones of *Bos longifrons*, Wolf or large dog, Red Deer (*Cervus elaphus*), and Wild Boar have been dug up.*

* Remains of Red Deer, Horse (*Bos longifrons*), and Ox have been obtained from the peat at South Ferriby, and a sketch of a pair of horn cores of *Bos primigenius* from New Holland appears in 'The Naturalist' for September 1903, p. 381. Red Deer antlers have also been found in the peat at Barton and New Holland.—T.S.

The Rev. E. Adrian Woodruff Peacock gives in his 'Fenland Soils' a fine word picture of the fauna of the peat. He says :— 'In the Oak forest of the old peat, Squirrels lived and piled their store of hazel nuts for winter food; Bees collected honey from the fragrant flowers of the Deer-haunted glades; the Marten Cat caught birds in the trees; and the Fox, Wild Dog, and Bear found a congenial home in the denser thickets. The Wild Boar and four species of Deer were rangers of the woods, and shared the pastures with two breeds of Oxen. Pike and other fish lived in the pools, which were also the home of the Otter and Beaver, while Swans and other birds, too numerous to name, visited the lakelets, and the Herons hunted the reedy shallows as they do to-day.'

Order CHIROPTERA.

Fam. VESPERTILIONIDÆ.

PLECOTUS AURITUS L. LONG-EARED BAT. Is a common species almost everywhere and has been taken many times in the county.

VESPERUGO NOCTULA Schreber. NOCTULE. Though generally a southern species, becoming more rare northwards, it occurs fairly numerous in Lincolnshire.

VESPERUGO PIPISTRELLUS Sch. THE COMMON BAT. Exceedingly abundant.

VESPERTILIO DAUBENTONII Leisl. DAUBENTON'S BAT. G. H. Caton Haigh says :— 'This is a local species from the nature of its haunts, and has occurred in most places in North Lincolnshire. In 'The Zoologist,' 1889, Mr. Haigh instances one resting on the water at Grainsby Hall, near Grimsby.

VESPERTILIO NATTERERI Kuhl. REDDISH-GREY BAT. Once obtained, Grainsby, July 1876, by G. H. Caton Haigh.

Order INSECTIVORA.

Fam. ERINACEIDÆ.

ERINACEUS EUROPEUS L. THE HEDGEHOG. Very common in all parts of the county. In the 'Field,' November 1889, Mr. Samuel Allenby reports a specimen 'perfectly white with pink eyes' occurring at Cadwell, near Louth.

Fam. TALPIDÆ.

TALPA EUROPEA L. MOLE. Very common. Mr. W. Burton, of Stamford, has a specimen of the white form of this mammal, taken in the neighbourhood.

Fam. SONCIDÆ.

SOREX VULGARIS L. COMMON SHREW. Very abundant.

SOREX MINUTUS L. LESSER SHREW. Fairly common in wooded districts.

CROSSOPUS FODIENS Pall. WATER SHREW. Common in the drains of the marsh and fen districts. The *black variety* occurs with it but is less common (G. H. Caton Haigh). Mr. A. R. Yeoman gives the following note in 'The Naturalist,' 1893 :— 'I captured a Water Shrew in Monk's

Naturalist,

Dyke, Louth . . . long since known in England, but lost till May 1768, when it was discovered in the fens near Revesby Abbey . . . burrows in the banks near water and is called by the fen men the blind-mouse.'

Order CARNIVORA.

Fam. FELIDÆ.

FELIS CATUS L. WILD CAT. It is scarcely probable that the Wild Cat is now to be found in Lincolnshire. The last-recorded specimen is the subject of an article in 'The Naturalist,' 1884, written by the late John Cordeaux. This animal was shot in 1883 by Mr. Arthur Belton, near Bullington Wood, Wragby. 'Cats have been known to breed there in a wild state for generations. There is, therefore, no improbability that this Cat may have descended directly from the old British Wild Cat. That it should be a reversion from the domestic race to the wild type is scarcely probable, unless we are prepared to allow for a strong admixture of original blood coming from pure wild ancestors which at no distant period inhabited the district.'

Fam. CANIDÆ.

CANIS VULPES L. FOX. This animal is exceedingly well known in the county, and is preserved in many places in the interest of sport.

Fam. MUSTELIDÆ.

MUSTELA MARTES L. PINE MARTEN. Now very rare, but still exists in some of the large woods in Mid Lincolnshire. A fine specimen is preserved in the Grimsby Museum presented by Mrs. C. S. Holgate.

MUSTELA VULGARIS Erxl. WEASEL. Common.

MUSTELA ERMINEA L. STOAT. Common.

MUSTELA PUTORIA L. POLECAT. Has decreased greatly during the last twenty-five years, but is still not uncommon in the coast marshes. Evidences of its existence in the Grimsby district appear as late as 1887, and it no doubt is still to be found here. It appears to be common about Mablethorpe.

MELES TAXUS L. BADGER. Generally distributed throughout the county, often attaining a great size. Mr. J. E. Mason records one in 1890, which took to the water, crossing the river Eau into Withern Fen.

LUTRA VULGARIS Erxl. OTTER. Though not numerous, this species, which is a great wanderer, is often turning up in all parts of the county. Records are to hand of two occurring at New Holland. Five seen at Uffington Springs in 1889. One weighing 21 lbs. was shot at Deeping St. James about the same time. It has also occurred at Louth, and many times in the Grimsby district. One was taken in January of this year (1904) at Hatchliffe Mill, and others have made their abode at Newsham Lake. One trapped at Cadney in the Ancholme, where the young may be found all the year round.

Fam. PHOCIDÆ.

PHOCA VITULINA L. COMMON SEAL. Found occasionally all round the coast but particularly in the Wash. On one occasion no fewer than 125 were counted on one sand, whilst in the water near there appeared to be a like number. Quite a thousand are sometimes in the estuary at one time.

PHOCA HISPIDA Sch. RINGED SEAL. 'It is stated by Mr. J. Cordeaux that an example occurred on the Lincolnshire coast as recently as the year 1889.' Bowdler Sharpe. Lloyd's Nat. Hist., p. 155. Mammalia.

HALICHOERUS GRYPUS Fabr. GREY SEAL. Has been killed off Tetney Haven and is occasionally met with in the Wash.

Order RODENTIA.

Fam. SCIURIDÆ.

SCIURUS VULGARIS L. SQUIRREL. Very common in all parts of the county.

Fam. MURIDÆ.

MUS MINUTUS Pall. HARVEST MOUSE. Very rare. Mr. Max Peacock saw it once in Bottesford Parish. A nest with female and young in wheat field in 1887.

MUS SYLVATICUS L. LONG-TAILED FIELD MOUSE. Very abundant. A large form of *M. sylvaticus* with a buff collar on throat, or rather on chest, which is found in many parts of the South and East of England, has probably occurred near Grantham. It has been described as distinct under the name of *M. flavicolles* (G. H. Caton Haigh).

MUS MUSCULUS L. HOUSE MOUSE. Very abundant.

MUS RATTUS L. BLACK RAT. Was once common in most of our seaports and is now met with occasionally. It still occurs on the Grimsby Docks, generally making its home in the grain warehouses.

MUS DECUMANUS Pall. BROWN RAT. Very abundant.

MICROTUS AGRESTIS L. COMMON FIELD VOLE. Very common. Mr. J. Cordeaux, referring to cultivation about the year 1793, says:—'In Deeping Fen we are told the mice (doubtless the Short-tailed Field Mouse) had multiplied to such a degree as to almost starve the sheep. The land was alive with them, so that a certain Mr. Greaves in a field of a few acres, killed eight or ten by his horse treading on them.'

MICROTUS GLAREOLUS Sch. RED BANK VOLE. Very common.

MICROTUS AMPHIBIUS L. WATER VOLE. Very common.

MUSCARDINUS AVELLANARIUS Kaup. DORMOUSE. Is said to occur in the woods of South Lincolnshire.

Fam. LEPORIDÆ.

LEPUS EUROPÆUS Pall. HARE. Very common throughout the county. White Hare was shot at Grunoldby in October 1889, and many instances of this form has occurred. A specimen is preserved in the L.N.U. Museum, Lincoln.

LEPUS CUNICULUS L. RABBIT. Exceedingly abundant. Rev. J. Conway Walter records a White Wild Rabbit recently seen at Fulletby in a warren, and states that black ones are by no means uncommon.

Order UNGULATA.

Fam. CERVIDÆ.

CERVUS DAMA L. FALLOW DEER. Preserved in Brocklesby Park by the Right Honourable the Earl of Yarborough.

Order CETACEA.

Fam. BALÆNIDÆ.

MEGAPTERA LONGIMANA Gray. HUMP-BACK WHALE. Only three or four specimens of this mammal have been recorded as occurring in British seas, one of which was stranded on the Lincolnshire Coast at Mumby Chapel in 1894. It was a small specimen about twenty-five feet long. Mr. G. H. Caton Haigh secured the head.

BALÆNOPTERA MUSCULUS L. COMMON RORQUAL. Has been stranded on the coast several times. At Eastertime of 1892, one got ashore at Spurn, and was brought across to Cleethorpes. The total length was 76 feet; girth behind flippers, 32 feet 4 inches; gape, 15 feet 6 inches; across tail, 15 feet 6 inches; length of pectoral fin, 7 feet 6 inches. A full description of this mammal is given by the late John Cordeaux in 'The Naturalist,' 1892.

BALÆNOPTERA SIBBALDI Bell. SIBBALD'S WHALE. One occurrence in the mouth of the Humber. This (the type) specimen was washed up in 1835, and has for many years been the chief attraction of the Hull Museum. It is the subject of the first of the 'Hull Museum Publications,' which gives an exhaustive account of this important exhibit. See 'The Naturalist,' August 1901, pp. 233-240; and July 1904, Pl. IX. for figure.

BALÆNOPTERA BOREALIS Lesson. RODOLPH'S RORQUAL. One of this species occurred in the Humber in 1884, taken at Goole.

BALÆNOPTERA ROSTRATA Fabr. LESSER RORQUAL. Once recorded for the Humber by J. E. Gray, 1873.

Fam. PHYSETERIDÆ.

PHYSETER MACROCEPHALUS L. SPERM WHALE. A most interesting early record—1563—is contributed by Mr. John Hopkins, of Grimsby, to 'The Naturalist,' 1885, and evidently refers to this species. In the 'Field Club' of 1891 a whale 13 feet long is recorded for the Lincolnshire coast, and in 1646 a 'school,' comprising some eight or nine individuals, appears to have entered the wash.

HYPEROODON ROSTRATUS Müller. BOTTLE-NOSED WHALE. Is almost of annual appearance. One occurred at Frieston in 1896. A skeleton is preserved in the Hull Museum. For a description of a shoal of 25 bottle-noses at Goole in 1863 or 1864 see 'Reminiscences of a Whale Hunt at Goole over thirty years ago.' Trans. Hull Scientific and Field Nat. Club, 1899, pp. 37-39, also 'The Natural History of Goole Moor,' loc. cit. 1898, pp. 7-8.

MESOPLODON SOWERBIENSIS Gervais. SOWERBY'S BEAKED WHALE. In 1885 a specimen appeared at the mouth of the Humber.

Fam. DELPHINIDÆ.

MONODON MONOCEROS L. NARWHAL. Only about three occurrences on British shores. The second record was a specimen taken near Boston in 1800.

PHOCÆNA COMMUNIS Lesson. COMMON PORPOISE. The commonest of British Cetaceans and of frequent occurrence.

ORCA GLADIATOR Gray. GRAMPUS. Occurred in the Humber 1885. Was captured at a point where the Ouse and Trent rivers meet, and is now, I believe, in the South Kensington Museum.

GLOBICEPHALUS MELES Bell. PILOT WHALE. A shoal appeared at Cleethorpes in 1862 (G. H. Caton Haigh).

LAGENORHYNCHUS ALBIROSTRIS Gray. WHITE-BEAKED DOLPHIN. Occurred off Grimsby, September 1879 (G. H. Caton Haigh).

TURSIOPS TURSIOS Gervais. BOTTLE-NOSE DOLPHIN. Fairly common, and has occurred along our coast a few times. J. Cordeaux reports one at Tetney Haven, August 25th 1888, and one at Spurn, 1879.

PSEUDORCA CRASSIDENS. LESSER KILLER. A skull was found in the fens near Stamford, and the species was believed to be extinct, but has subsequently been found living in the North Sea.

NOTES ON *ASTER TRIPOLIUM*.

T. PETCH, B.Sc., B.A.

THE existence of two forms of the Sea Aster is well known to the naturalist who has the fortune to live near any of our estuaries, and, taking a broad view, he comes to associate them with a difference in habitat without inquiring too deeply into the foundations of his belief.

Our Floras deal with these two forms in the usual way. Bentham, as revised by Hooker (Ed. 6), says: 'Florets of the ray purplish, numerous or few, and occasionally wanting'; Syme's 'English Botany' (Ed. 3) makes two varieties, 'var. *a. genuina*. Florets of the ray ligulate, spreading, white or lilac. Var. *β. discoidens*. Anthodes discoid without a ray.' There is, of course, no attempt to correlate form with habitat.

In the 'Essex Naturalist' (Vol. 12, 1902, p. 237), Mr. Percy Clarke notes that the Sea Aster on the salt marshes overflowed at spring tides have small golden heads, but inland on the side of dried up ditches or on low banks they possess a ray: that in many cases the former have a few poorly-developed ray florets, but the majority have none. He suggests that it is a case of degeneration from the rayed to the non-rayed form, with a change from insect pollination to wind pollination, and is supported by the Editor, who states: 'Diptera and Hymenoptera frequent both forms, but in my experience are in far greater profusion on the rayed.' The only other reference I have been able to find is a note by Dr. Julius MacLeod (Bot. Centralb., Bd. 29, p. 215); he notes that both forms grow together.

Mr. Clarke's observation as to the occurrence of the two forms coincided with the impressions derived from a long acquaintance with the estuaries of the East Coast, though his conclusions seemed open to criticism, and to test these, an investigation was instituted on the Humber shore. The immediate result was surprising, for it showed that the broad view hitherto held was quite erroneous, and that Dr. MacLeod was correct in stating that on the salt marsh the two forms grow together.

The distribution of these forms in the Humber district is as follows:—

- (1) The plants along the ditches inland possess conspicuous, rayed flower heads.

- (2) The prevailing form on the salt marsh is sparingly rayed, having any number of rayed florets up to sixteen (0-16) on the flowers of the same plant. In many cases the rays are bent downwards and pressed close to the involucre after flowering, so that they are easily overlooked. Plants in which no flower possesses ray florets are not so common.
- (3) Well-rayed plants with sixteen to thirty ray florets in each head occur in all parts of the salt marsh, even at its extreme outer edge.

Thus, presuming that the salt marsh is the natural habitat of *Aster tripolium*, the normal form would appear to be that with a few ray florets. The plants which grow inland are the representatives of a former salt marsh flora, the direct descendants of sparingly rayed individuals which managed to survive enclosure. Near the Humber they may still be found on land enclosed a hundred years ago, but as a rule they disappear when further reclamations place them at a greater distance from the coast, and the ditches become less brackish. With their more conspicuous flowers they acquire also thinner leaves, larger intercellular spaces, more chlorophyll, and a normal mesophyll in place of one 'toute palisadique' (Lesage, Influence du Bord de la mer sur la Structure des Feuilles, 1890). It seems to be, therefore, an instance of the well-known horticultural fact that a check to vegetative growth induces the production of larger flowers. The occurrence of well-rayed plants on the salt marsh, however, hinders the adoption of such an obvious solution, but, whatever the cause, the plant advances from the few to the many-rayed form, not from the rayed to the non-rayed.

Only in one place were discoid flowers found inland. These grew on a small area east of Patrington Haven, which was enclosed about six years ago. This is surrounded by a drain inside the enclosure, about three yards from the bank, thus preventing the cattle from straying on the salt marsh. In 1904, constant grazing had exterminated the *Aster* which previously grew on the reclaimed land; but on the bank and on the level on both sides of it the discoid form was common.

The two 'varieties' may be gathered from the same plant. On a plant which possessed thirteen main flowering shoots, eleven bore discoid heads only, while the heads of the other two had from 0 to 8 rays. Conversely those plants on which the

majority of the flowers are rayed may have two or three stems of discoid heads only.

The arrangement of the capitula is ultimately cymose. It frequently happens that immediately behind the leading flower (a) there grows a younger and less conspicuous one (b). In these we have such numbers of florets as the following:—(a) 11 ray + 27 disc, (b) 0 ray + 22 disc; (a) 9 ray + 20 disc, (b) 0 ray + 18 disc; (a) 18 ray + 27 disc, (b) 12 ray + 27 disc; (a) 7 ray + 18 disc, (b) 1 ray + 18 disc. The second flower almost invariably has fewer ray florets and generally fewer disc florets. But how such difference can be induced on different stems of the same plant or in two plants growing close together is inexplicable.

Dr. MacLeod states (loc. cit.) that the discoid head has ten or more florets, while the rayed head has twenty to twenty-five disc florets and fifteen to twenty rays. Specimens gathered on the Humber shore were divided according to their general appearance into rayed, non-rayed, and intermediate. The heads of the rayed plants contained 10-30 rays and 18-38 disc florets; the intermediate contained 0-16 rays and 18-31 discs; while the non-rayed heads consisted of 8-25 disc florets. An examination of several hundred flowers showed that there was a wide variation in the number of florets per head and their division into disc and ray among the flowers of a single plant, but that the well-rayed flowers were less variable than the intermediate form. Thus, rayed flowers on the same plant vary from 19 rays + 25 discs to 30 rays + 31 discs; 17 rays + 20 discs to 21 rays + 30 discs; 13 rays + 19 discs to 17 rays + 23 discs; while the intermediate plants vary from 0 rays + 17 discs to 16 rays + 29 discs; 2 rays + 21 discs to 14 rays + 31 discs; 2 rays + 18 discs to 13 rays + 21 discs. In general a rayed head, no matter how few the rays, possesses more disc florets than a discoid head; and an increase in the number of rays is accompanied by an increase in the number of disc florets. The maximum number of florets in a head was 66, 28 rays + 38 discs; the number of disc florets exceeds the number of rays in most cases, a few exceptions occurring with the higher numbers of ray florets, e.g., 31 rays + 31 discs.

An analysis was also made of disc and rayed heads taken at random from the same and different plants. In one head consisting of 18 rays + 27 disc florets, the ray florets showed the lengths, ovary 1.6-2 mm., tube 3.5-4 mm., limb 9-10 mm., and breadth of limb 1.5-1.8 mm. The disc florets were 8.5-11.5 mm.

long, made up of ovary 2.2.6 mm., tube 3.4.1 mm., bell 2.5.4.2 mm.; the breadth of the bell (unopened) was slightly more than 1 mm. In a disc flower of 24 florets the length varied from 8.10.6 mm., made up of ovary 2.2.6 mm., tube 3.4.1 mm., bell 2.5.4.2 mm. In this 12 florets were less than 9 mm. long; in the first only 2. The dimensions of the florets in the same heads differ therefore, increasing towards the centre, and the florets of a rayed head are, for corresponding positions, longer than those of the discoid head; there is no appreciable difference in breadth. This is contrary to MacLeod's observation. He says: 'The form without ray florets is in all parts a little greater. The ovary is 2 mm. long (instead of 1.5 mm. in the first form); the corolla tube 4.5.5 mm. (instead of 4.4.5).' As the receptacle is flat, while the capitulum is slightly conical, it is obvious that the inner florets must be longer than the outer, and in all the heads examined the florets of the discoid form have been found, on the average, smaller than those of the rayed flower.

An abnormal disc floret was found in most of the heads, occurring sometimes two or three times in a single head of the intermediate form. This had two corollas, each with anthers and style, arising from a single ovary. In some cases a second ovary was indicated by a groove a short distance from one side, in others two equal ovaries were united along their narrow edge.

In 1902, specimens of *Aster tripolium* were gathered near Barking (Essex) from an inland pool which was kept brackish by the water which percolated through the river bank at high tides. They were, fortunately, preserved as the largest flowers which had come under my notice, some of the heads measuring 3 cms. in diameter. On examining them it was found that though one head contained 35 ray + 48 disc florets, the others had 17-24 rays and 23-36 discs, and were therefore inferior in number of florets to many of the salt marsh flowers. The rays, however, were almost uniformly 12 mm. long and 2 mm. broad after drying, so that their exceptionally handsome appearance was due to an increase in the size of the rays instead of an increase in their number.

Bees and flies visit both forms alike. Caution must be exercised in drawing conclusions from the number of insects seen on a given area at any one time; in a strong breeze very few insects will be found on the exposed salt marsh, while at the same time they may be abundant on the plants in the

sheltered districts inland. On 7th September 1904, Red Admiral, Tortoiseshell, and Small White butterflies were common on rayed and discoid flowers near Patrington Haven. Mr. T. Stainforth informs me that he has also taken the Camberwell Beauty on Aster at Cleethorpes.

SUMMARY.

- (1) *Aster tripolium* when growing inland possesses well-developed ray florets. Such plants are the survivors of a former salt marsh flora.
- (2) The dominant form on the salt marsh has sparingly rayed and non-rayed heads on the same plant.
- (3) As well-rayed plants occur in all parts of the salt marsh, it is not possible to assign a definite habitat to each form.
- (4) A rayed head has more disc florets than a discoid head, and the number of disc florets increases with the number of rays.
- (5) The florets of a rayed head are larger than the florets of a discoid head.

NOTES ON COLEOPTERA COLLECTED AT RYDAL, 22nd to 28th JUNE 1904.

JAMES E. BLACK, F.E.S.,

Peebles, N.B.

DURING a week's stay in this beautiful district of Lakeland, I had the opportunity of working the Coleoptera of the district near Rydal in fine summer weather. Practically two altitudes were worked, that of the lake itself, and the heights above, to about 2,500 feet.

Beetles were more abundant on the lower ground, and on the lower slopes of the surrounding mountains, than on the highest parts, and perhaps the season was somewhat advanced for many of the better species, but the following list will show fairly well what was to be had.

Amongst the Carabids, one quite black example of *Carabus arvensis* was obtained about 2,000 feet above Rydal Lake, on

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the sides of Erne Pike, and *Pterostichus vitreus* was fairly common under stones about there. *Amara lunicollis* occurred about 1,000 feet above Grasmere, and also *Patrobis assimilis*. *Bembidium rufescens* was taken under bark of a fallen tree by the lake, and some of the common species were seen plentifully, such as *Nebria gyllenhali*, *Pterostichus strenuus*, etc.

The water beetles found included some Hydropori from peat-holes up above Nab Scar, amongst these being *Hydroporus tristis*, *H. morio*, *H. obscurus*, *H. gyllenhali*, and *H. pubescens*, whilst the var. *soleri* of *Agabus bipustulatus* was also taken.

Amongst the Staphs but little was done, but a nice *Bolitochara lucida* was got under bark by Rydal Lake, and *Stenus guttula* turned up by the riverside, and one example of *Lesteva sicula* was also obtained. Under bark two species of *Agathidium* occurred, *A. seminulum* and *A. nigrinum*, and in fungus on a tree stump *Scaphisoma agaricinum* and *Octotemnus glabriculus* were taken.

Sinodendron cylindricum and two examples of *Melandrya caraboides* were found in an old Ash tree, and on the highest point touched several species of *Aphodius* were got in sheep dung, such as *A. ater*, *A. constans*, and *A. lapponum*, whilst *A. fœtens* and *A. depressus* were taken near the lake.

The only *Geotrupes* obtained was *G. sylvaticus*, which was common on the high parts, where *Corymbites cupreus*, and more especially the var. *æruginosus* also abounded, being often found struggling in the peat-holes.

Other Elateridæ included *Athous niger* in fine condition, *Agriotes obscurus*, etc. The Telephoridæ were in full force, and amongst these may be recorded *T. figuratus*, *T. paludosus*, *T. obscurus*, and *Podabrus alpinus*. Longicorns were only thrice seen, viz., *Grammoptera ruficornis*, *Leioptus nebulosus*, and *Rhagium bifasciatum*.

By the shores of Rydal Water, sweeping produced *Donacia thalassina*, which is considered a southern insect, *D. sericea*, *D. cinerea*, and *D. affinis*, whilst one *D. discolor* was got in the peat-holes already referred to.

Polydrusus micans, swept by the lake side, various species of *Phyllobius*, *Apion hæmatodes* and *A. marchicum* complete the list of the more outstanding species met with. The names have all been carefully verified by the kindness of Prof. T. Hudson Beare, B.Sc., etc., of Edinburgh.

ADDITIONAL NOTES ON RYDAL BEETLES.

MARY L. ARMITT.

BESIDES the foregoing beetles, and among the 79 species taken by Mr. Black may be mentioned *Cyolonotum orbiculare*, *Scaphisoria agaricinum*, *Sphæroderma cardui*, and *Apion marchicum*, which have probably not been recorded for the district before.

In addition, I may add a few species kindly identified for me at various times by Mr. Black, or by Mr. Hardy, of Owens College, Manchester.

CICINDELA CAMPESTRIS, the Tiger Beetle, is to be found on sunny April days, from the 10th onwards, winging over the bare friable patches of ground whence it seems to emerge.

STAPHYLINUS STERCORARIUS. Taken in the garden.

STAPHYLINUS ERYTHROPTERUS, the beautiful ruddy-winged Rove Beetle, may be seen in abundance, male and female, on the last days of May, in the mountain valley of Rydal Head, at a height of 500 feet. I have seen it there too as late as 4th September.

OCYPUS CUPREUS. Taken when chasing the helpless winged Ants that were settled in hundreds on the road.

SILPHA NIGRITA. Rydal Head.

APHODIUS PUNCTATO-SULCATUS. Very abundant at the end of March and early April.

GEOTRUPES TYPHÆUS makes borings quite distinct from the ordinary Dor Beetle—probably *G. stercorarius*.

MELOLONTHA VULGARIS. Not common.

PHYLLOPERTHA HORTICOLA, the Bracken-clock comes out in tens of thousands in the hot days of early June. Flocks of Black-headed Gulls arrive in the valley to feed on it, and remain—taking alas! the larger May-fly too, just out upon the lake—during the three weeks or so of its short existence. Other birds gorge upon it, too, the Pied Flycatcher among them, as well as a predatory beetle (species undetermined).

LAMPYRIS NOCTILUCA. I have seen the Glow-worm no nearer than the Tarns above Conistone, but am told of it at White Moss Common, in our parish.

ANOBIUM DOMESTICUM begins to emerge from old pieces of furniture in the first spell of hot weather in July.

RHAGIUM INQUISITOR was taken (24th May) from an old Birch tree in the park.

RHAGIUM BIFASCIATUM emerges every year from the scarlet Oak of the garden.

PHÆDON TUMIDULUS.

MELOË VIOLACEUS, the Oil Beetle, is found in the garden, as well as on the fell-bank, when the Apple Moss is just (31st March) in fine fruit.

PHYLLOBIUS VIRIDÆRIS.

CIONUS SCROPHULARIÆ has been noticed before in 'The Naturalist.' Its slimy larvæ and seed-like pupæ are general on the Figwort of river and lake side. But it is upon the woolly leaves of the Mulleins of the

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garden that the perfect insects are found in early June congregating and mating. As the two plants are often a considerable distance apart, the insect is possibly in its flight directed by scent.

CEUTHORRHYNCHIDIUS CHERROLATI. After the great flood of 2nd November 1898, the meadow below Pelter Bridge was washed bare, and the galls on the roots of the Yarrow plant, in which this insect passes the first stages of its existence, were revealed.

THE HOLLY (*ILEX AQUIFOLIUM*).

P. Q. KEEGAN, LL.D.,

Patterdale, Westmorland.

A NATIVE tree, but really an emigrant from Southern Europe, the Holly has attracted universal attention. The 'hedge of Hollies dark and tall,' how grateful its impervious screen when 'frosty winds howl from the north!' In the dreary depths of wintry gloom it preserves a glossy brilliancy of green endearing to the hour surpassed by none—nay, not approached by any other of our cold-sustaining plants. The vivid coral redness of its berries, too, strike light amid the woodland vacancies or within the gardens dull and despoiled every one. Judging by externals, the Holly is forsooth a fine organism, and that it is fine internally as well the following account may serve to demonstrate.

STEM.—The wood is hard and heavy (specific gravity 0·76 to 0·95), very homogeneous and uniformly white, with no distinction between alburnum and duramen. The medullary rays are in four to eight rows, some of them being 1·5 mm. high; the vessels are very narrow ($35\ \mu$ in radial width), of about equal size, forming a single row at the commencement of each annual ring, but elsewhere grouped in a radial series of from five to twelve, their walls have small bordered pits and scalariform thickening; the fibres are very homogenous, of oval or squarish section, have thick pitted and striated walls, and are intermixed with numerous little groups of very fine parenchyma-cells. The bark is composed of a medley of large, thin-walled cells, arranged tangentially, which are interspersed throughout with large and small patches and îlots of sclerous cells rich in crystals, and also with well-developed sieve-tubes which remain active for several years; the small bundles of primary liber fibres are separated from the soft liber by three or four layers of parenchyma cells, and at the external limit of the latter there is ultimately formed a compact mass or continuous ring of

sclerenchyma; the primary cortex of collenchyma and sclerous cells is thin and remains green and living for a long time; an external periderm of very stout cells is formed only in later years—the whole finally becoming grey and inert, but no secondary periderm, and therefore no rhytidome, are ever produced. The wood contains ilicene, a little tannin and coniferin, but no resin, phloroglucin, or glucose; the starch nearly disappears from the main stem in winter, but appears again in March, then temporarily regresses at flowering time, and once more slowly revives in summer to gradually diminish during the autumn. A branch over 1 inch diameter, cut in September, was chemically examined; the dried bark contained 6·8 per cent. of a highly remarkable gluey, viscid substance called ilicic alcohol by Personne, but found to be a hydrocarbon called ilicine $C^{35}H^{60}$ combined with a fatty acid, by Schneegans and Bronnert (it constitutes the active portion of the well-known bird-lime prepared from the Holly), also 2·8 per cent. tannin, a little resin, some pectosic mucilage, a considerable quantity of soluble albumenoid, but no true fat, phlobaphene, or phloroglucin, and very little or no sugar. Chippings from the stump of a tree about 5 inches diameter, felled in the snow on 17th February, yielded in the dried bark 10·1 per cent. of ash which had 12·5 per cent. soluble salts, 5·9 silica, 44·7 lime, 6·2 magnesia, and 0·9 P^2O^5 ; the wood yielded 0·5 per cent. of ash which had 48·4 soluble salts (sulphates), 2·7 silica, 11·2 lime, 16 magnesia and manganese, 4·1 P^2O^5 and 22·7 SO^3 .

LEAVES.—The 'wrinkled, keen, and glossy' leaves exhibit structures of great beauty and eminent physiological interest. There is only one vascular bundle in the petiole (a sign of organic perfection, possibly consequent on pinnate disjunction, according to Chatin). The blade consists of a strongly cuticular epidermis, one layer of hypoderm cells, three compact layers of short, close-set palisades densely chlorophyllous, and a lacunar tissue forming a network of cells filled with starch, and enclosing large irregular interspaces; the prickly teeth and thickened edges of the leaf are secured by layers of sclerous fibres, and, save some short solid bristles on the petiole, there are no hairs; the stomata are of moderate size, and in number amount to 276 per square mm. of surface. The leaf is nearly 0·5 mm. thick, and hence absorbs much heat and remains living and active for about fourteen months. On 7th June the leaves of last year's shoots contained 1·6 per cent. of ilicene combined with fatty acid (as in the bark), also some resin, but no fat oil

and very little carotin, 1.7 tannin and tannoid, some pectosic mucilage, quinate of calcium, much starch and oxalate of calcium, but no sugar and little albumenoid; the ash amounted to 4.5 per cent. in dry and had 30.8 per cent. soluble salts, 4 silica, 27.8 lime, 7 or 8 iron and manganese, 4.5 P_2O_5 and 4.6 SO_3 . In winter the starch vanishes from the mesophyll and remains only in some few isolated cells in the central portion of the mid-rib. The eminent xerophily of the leaf is attested by the very thick double-layered cuticle and the hypoderm beneath it, but the palisade-tissue, though well differentiated as regards number of layers, occupies only a little over one quarter of the thickness of the leaf, and hence the organ is only moderately heliophilous, and seems better adapted against excessive transpiration, or as a storehouse of material than as an instrument of vigorous assimilation. The brown shades of the faded leaves are due to quinone derived from the oxidation of the tannin.

FLOWER AND FRUIT.—The small solitary or clustered flowers are grouped in axillary umbellate cymes, and have a gamosepalous calyx and a nonconstant gamopetalous corolla. The ovary is of oval form, 3 mm. long and 2 mm. diameter; its wall is 0.64 mm. thick and is made up of about forty layers between its epiderms. The ripe fruit is a berry-like drupe enclosing four one-seeded triangular nuts. It is composed of (1) a thick wax-coated epicarp with an underlying hypoderm, (2) a mesocarp of globular cells not very large, and (3) an endocarp composed of an outer zone of sclerous cells traversed by strands of fibres and fibro-vascular bundles, a middle zone of a ring of fibres, and an inner zone of fibres diversely directed. The seed has an outer layer of thick-walled cutinised squarish cells, an inner layer of thin oval cells, a thick fleshy endosperm, and a small apical embryo. The pericarp contains no starch; but encloses a large quantity of pectosic mucilage with tartaric and malic acids and salts, also glucose, cane-sugar, tannin, a well-developed and pure pigment, a violently purgative resinous substance (10 to 12 berries make a good purge), and the whole fruit has 1.1 per cent. of ash in fresh which has 46.7 per cent. soluble salts, 14.1 lime, 5.3 magnesia and manganese, 2.1 oxide of iron, 10.07 P_2O_5 and 4.9 SO_3 . The seeds enclose aleurone and oil as reserve materials, but no starch; they ripen here, but do not vegetate in the first year.

SUMMARY.—The Holly thrives best on rich sandy or gravelly loam, or on gravel over chalk; therein it is indigenous with us.

A study of the anatomical characters will show that this tree is strictly xerophilous (drought-loving), while a review of the chemical composition reveals the very important fact that it differs seriously from that of the vast majority of our native and denizen trees and shrubs. The capital feature is the vigorous vitality—the constitutional robustness evinced by the perennial greenness of the bark, the wealth of starch in the leaves, the activity of the sieve-tubes, the redundancy of fruit, and the magnificently perfected wood as a detail of the powerful faculty of lignification which predominates in every organ of the fabric. The consummation of organisation is attested by the unitary type of bundle in the petiole, while the provision of a special weather-resisting substance (ilicene) in bark, leaves, and young shoots ensures that the rigour of external conditions shall be nullified, that, e.g., the accumulation of starch in the leaves shall not depend on the intensity of the illumination which they receive at any particular period, but rather on a species of hereditary periodicity connected with the ratio of the forming-rate to the using-rate, and with the ease of migration to other parts of the plant. The perfect vegetation of the Holly tree is expressed chemically by the steady increase of lignin and by the diminution as we have seen of the albumenoids and insoluble principles whose chemical actions are accomplished. Even the leaves of over one year old contain very little silica (less even than Scotch Pine needles of same age)—a negative but perfectly reliable sign of the maintenance of active vitality; and moreover, when they actually die and wither on the tree their tints or shades are not those of principles allied to chlorophyll (as in the Elm and Sycamore), but are derivatives of a tannin which in cases of extreme oxidation assumes a very dark brown, not red-brown, shade. It may be useful to add that the original suggestion of Jussieu and Brongniart that the true systematic position of the Holly is in the Gentianales alliance, and not near the Spindle-trees or the Milkwords, is fully supported and confirmed by the results of the chemical analysis.

BIRDS.

Hen Harrier Breeding in East Yorkshire.—I have recently inspected a pair of these birds in a case with four young, and have obtained satisfactory evidence that they were killed, the young being taken from the nest, on Baildon Moor, about 1863.—S. L. MOSLEY.

FIELD NOTES.

ARACHNIDA.

Yorkshire Spiders.—Notes of Captures on the East Coast.—In the paucity of Yorkshire records the following spiders, selected from amongst a number of commoner species, and collected on the East Coast in August 1904, are worthy of notice :—

Harpactes hombergii Scop. Whitby.

Hahnia montana Bl. One female, Scarborough Mere. Though of wide distribution in the British Isles, this spider has not been taken outside these limits.

Leptyphantes obscurus Bl. One male and two females, Hayburn Wyke. A local spider though widely distributed.

Tmeticus scopiger Grube. One male from heather, Ravenscar.

Tmeticus prudens Cb. One female, Ravenscar. A rare spider.

Microneta conigera Cb. Hayburn Wyke. One female of a 'variety sent to me also from Nottinghamshire (Rev. O. Pickard, Cambridge.)' A rare spider.

Microneta sublimis Cb. One male and one female from heather, Ravenscar. A rare spider recorded from the Cheviots and Mount Helvellyn, which reaches its present southernmost limit near Huddersfield, where I have taken several specimens of both sexes at various times between the years 1901-4.

Maso sundevallii Westr. Two females, Hayburn Wyke. This species and some others are usually accounted rare, but I believe they are only apparently so owing to their habit of close concealment, and the absence of competent observers.

Gongylidium retusum Westr. One male, Scarborough.

Peponocranium ludicrum Cb. One female, Ravenscar.

Cornicularia cuspidata Bl. One female, Scarborough.

Ceratinella brevis Wid. One female, Scarborough.

Ero thoracica Wid. One female, Ravenscar.

Trochosa picta Hahn. A few immature examples, North Bay, Scarborough.

Euophrys frontalis Walck. Scarborough Mere and Scalby Mills.

—WM. FALCONER, Bank Field, Slaithwaite, 9th November 1904.

***Tmeticus reprobus* Cb. at Llandudno.**—In August 1904, I was fortunate enough to capture on the sea coast (its usual habitat), near the Little Orme, one male *Tmeticus reprobus* Cb., which, as the only example taken up to the present time on the west coast of England, I am anxious to record. It is one of our rarest spiders, and has not occurred anywhere but in the British Isles, and then only in a few widely-separated localities—Weymouth, Edinburgh, Dublin Bay, Whitby, Northumberland, and Llandudno.—W. FALCONER, Bank Field, Slaithwaite, 9th November 1904.

REVIEWS AND BOOK NOTICES.

OLD BINGLEY.

Mr. Harry Speight's 'Chronicles and Stories of Old Bingley,' has reached a fourth edition and is sold at a reduced price (2s., Elliot Stock, London). A book of 417 pages, with 100 illustrations, cannot be dear at that price; but when it is the product of the pen of Mr. Speight, whose care for accuracy and ability to write is so well known, its cheapness is simply astonishing. Throughout the work its author has been careful to present the most recent discoveries before his readers, and towards this



Druid's Altar, Bingley.

end has taken full advantage of the records published in 'The Naturalist.' In addition to the portion relating to the history of the parish, there are notes on the geology, birds, plants, etc., of the district, items of particular interest to the readers of this journal. That relating to Bingley during the 'Ice Age' presents a summary of the glacial evidences in the area, though nowadays the astronomical theory of the cause of the Ice Age is not generally accepted. We are permitted to reproduce one of the numerous illustrations.

Notes of an East Coast Naturalist. By Arthur H. Patterson. Methuen & Co. 6s. Pages xii. + 304.

In this work Mr. Patterson gives the result of his twenty-five years' work amongst the birds and fishes of Norfolk. In it will be found a mass of valuable records and observations—which will be of service to others

Naturalist,

outside the particular area covered by the book. The author is a naturalist of the right sort, and has been able to put his notes concisely and in an entertaining manner. It is pleasing to find that in recent years he has entirely discarded the gun as a 'help' to observation, and has derived comparatively more real pleasure and interest in the pursuit of wild life with a field glass than he ever did with a fowling-piece. The attractiveness of the book is greatly added to by the twelve coloured plates after drawings by F. Southgate. These are magnificent and are obviously the work of a clever artist who is also a naturalist.

Warrington's Roman Remains. By **Thos. May.** Mackie & Co., Warrington, 5s.

For many years Mr. May has been conducting a series of excavations at Warrington on the site of a Roman Oppidum, and in this little work brings together the results of his labours. In addition to the figures and descriptions of objects such as usually occur on the sites of Roman camps, etc., exceptional interest is attached to Mr. May's volume from the announcement therein of the discovery of the earliest known glass, iron, and bronze furnaces in Britain. These 'finds' are described in great detail, and numerous illustrations thereof are given. Every credit is due to Mr. May for the work he has done and for the manner in which his results are made known. The objects found have been placed in the Warrington Museum—their proper home.

Notes on the Natural History of the Bell Rock. By **J. M. Campbell.** David Douglas, Edinburgh. 3s. 6d. net.

In this little book the author brings together a most interesting series of chats on the various aspects of natural history which came under his observation during nine years' residence on the rock whilst stationed at the lighthouse. Mr. Campbell is a keen and accurate observer of nature, and writes in a pleasant style.

The paper on 'Roman Remains at Easington' (illustrated), read to the Yorkshire Naturalists' Union meeting at Withernsea, in July last, has been published in the 10th Quarterly List of Additions to the Hull Municipal Museum, together with other matter. (One penny. A. Brown & Sons, Hull.) The principal items in Hull Museum Publications, No. 22 (11th Quarterly Record of Additions) are 'Roman Villa at Harpham' (with plans of the pavements), 'British Burial Customs in East Yorkshire over 2,000 years ago,' and 'The Buff Tip Moth.' There are numerous short notes on geology, natural history, and antiquities, and nine illustrations. (A. Brown and Sons, Hull, one penny.) Publication No. 23 deals entirely with 'The Roman Villa at Harpham,' and has coloured plates illustrating the pavements, etc.

NORTHERN NEWS.

We regret to record the death, in December, of Mr. Charles Golding Barrett, author of 'The Lepidoptera of the British Islands.'

Mr. Leo. H. Grindon, President of the Manchester Field Naturalists and Archæologists' Society, died in Manchester recently, in his 87th year. Mr. Grindon was a prolific writer, amongst his works being 'British and Garden Botany,' 'Phenomena of Plant Life,' and by way of variety, 'Manchester Banks and Bankers.'

Mr. W. P. Pycraft records the occurrence of a fine male Pacific Eider-duck (*Somateria v-nigrum*), killed at Scarborough on 16th December. This is the first record of this species on our shores.

Mr. W. Eagle Clarke contributes a paper 'On the Vole and Shrew of the Orkney Islands,' and another on 'The Birds of the Flannan Islands,' to the 'Annals of Scottish Natural History' for January.

A valuable addition has recently been made to the botanical collection in the Hull Municipal Museum in the form of a collection of 100 specimens of British Hepaticæ, carefully mounted and named by Mr. W. H. Pearson, Manchester.

The Rev. W. J. Wingate, of Bishop Auckland, informs us that in examining some papers of Mr. Backhouse, of St. John's, Walsingham, dated about 60 or 70 years ago, he finds a record of *Urocerus* [*Sirex*] *juvencus*, on the top of York Minster.

Mr. J. Cosmo Melvill has written a brief account of the General Herbarium formed by himself and presented recently to the Manchester Museum. The collection contains some exceedingly valuable sets of plants. (Manchester Museum Handbook, No. 54.)

The North Staffordshire Field Club is establishing a Reference Library—the 'Daltry' Library—in memory of the services to the club of the late Rev. T. W. Daltry, M.A., F.L.S., F.E.S., who had been Honorary Secretary to the Club for 38 years. Daltry was born at Hull in 1832.

The York and District Field Naturalists' Society has issued an attractive 'Member's Card,' which contains a list of the officers, syllabus of lectures, catalogue of the library, copy of the Society's rules, library rules, and four blank leaves for notes. Mr. G. Benson is the President, and Mr. Harwood Brierley the Hon. Secretary.

The 'Annual Report of the Leeds Naturalists' Club and Scientific Association' for 1904, recently presented, showed a good record of work done. Fortnightly meetings were held during the session, when many interesting specimens were exhibited and discussed. The president for 1905 is Dr. E. Octavius Croft, and the hon. secretary Mr. J. M. Butler, 214, Tempest Road, Leeds.

The frontispiece to the January 'Journal of Conchology' is a reproduction of a photograph of the members of the Conchological Society, taken at the last annual meeting. Many prominent workers—contributors to this journal—were present. The same journal contains Mr. Scharff's Presidential Address, entitled, 'The Origin of the Land and Freshwater Mollusca at present living in the British Isles.'

The Scarborough Corporation has decided to prevent as far as possible the erosion of the coast on the north side, by the erection of groynes, and by extending the toe of the existing apron of the sea-wall down to shale-level by means of steps. The Borough Engineer estimates a loss of 18,000 or 20,000 tons of shale from the front of the sea-wall of the Albert Drive since 1887-8, when the wall was built.

In a paper entitled 'Ten Years' Captures of New British Beetles' (Trans. Leicester Lit. and Phil. Soc., Vol. 8, Part 2), Mr. H. St. J. Donisthorpe includes a record of a capture of a single specimen of *Agathidium badium* at Patterdale, on Lake Ullswater, in September (? 1903). In the same publication Mr. A. Bruce Jackson has some interesting 'Notes on Leicestershire Eyebeights.'

From a reprint of an article in a local paper, we learn that the Deadly Nightshade (*Atropa belladonna*), which has been known to grow on Nottingham Castle during the past 40 years, has at last been identified—and by a Hull man! 'Its real character was proved a few days ago by comparing its black glossy fruit with that pictured in Hume's coloured plates, illustrating his work on wild flowers.' Can it possibly be that this plant has been 'known but unidentified for 40 years'?

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Eggs of the Sandwich Tern in Cumberland.

NOTES AND COMMENTS.

COLOURATION OF EGGS.

In the 'Memoirs of the Manchester Literary and Philosophical Society,' recently issued, Mr. Ellison makes an interesting communication with reference to the colouration of eggs, and gives examples of exceptions to the theory of protective colouration, such exceptions being in the case of eggs of birds which nest together in large numbers, as the Sandwich Tern, Black-headed Gull, Guillemot, etc. In the case of the Guillemot 'it is generally supposed that the birds having had few enemies, the colouration of the eggs is not subject to any natural restraint and they have developed extraordinary variations.' Similarly 'the Sandwich Tern and the Black-headed Gull often breed together in perfect harmony, and, being very pugnacious, protect themselves by uniting in force to drive off their enemies.' In illustration of his remarks Mr. Ellison gives a plate showing the eggs of the Sandwich Tern in Cumberland, which the Society has kindly permitted us to reproduce (Plate I.).

BIRDS BY LAND AND SEA.

The number of books that has been published in recent years relating to bird life surely makes it difficult for the authors to select a suitable title for their works. The publishers' difficulties, however, must be of a more serious nature. Owing to the great quantity on the market a book dealing with this subject must have something substantial about it—it must be well 'got up,' carefully written by one who is familiar with his subject, and must be well illustrated. 'Birds by Land and Sea,'* by J. M. Boraston, meets with all these requirements. In its 270 pages the author gives a careful record of almost daily observations of birds occurring near Stretford, on the northern bank of the Mersey, during the twelve months ending September 1903. Notes on the birds of Cheshire, Anglesey, and Puffin Island are also given. But the great charm of 'Birds by Land and Sea' lies in the fifty-odd plates containing photographs of birds and their nests and eggs. The beauty of these has been rarely excelled, and in themselves they are worth the half-guinea charged for the volume. One of these we are able to reproduce by the courtesy of the publishers (Plate II.). The printing of the book has also been carried out with care and reflects every credit upon those concerned.

* John Lane, London, 1905.

CHARA AND SHELL MARL.

Messrs. J. D. Dean and J. W. Jackson have recently described* an interesting deposit at Hawes Water, Silverdale, Lancashire, which bears many resemblances to similar deposits in East Yorkshire and Lincolnshire; in which counties they would well repay careful examination. The marl at Hawes Water is covered by a bed of peat, and indicates a former



Cliffs of Marl at Hawes Water.

greater extension of the sheet of water. Some of the species in the deposit have not so far been found living in the tarn. Lists of shells in the marl, and living in the district, conclude this interesting article. The illustration, kindly lent us for the purpose, shows a section in the marl at the side of the tarn.

OLD INGLEBOROUGH.†

Under the above heading, Mr. H. M. White, who styles himself 'The Lonsdale Hermit,' brings together in pamphlet form a series of articles on the geology and early history of Ingleborough, which are worth preserving. In addition to notes on the solid geology and drift deposits, there are

* Journal of Conchology, January 1905.

† Elliot Stock, London, 1904, 108 pp., 2s. 6d. net.



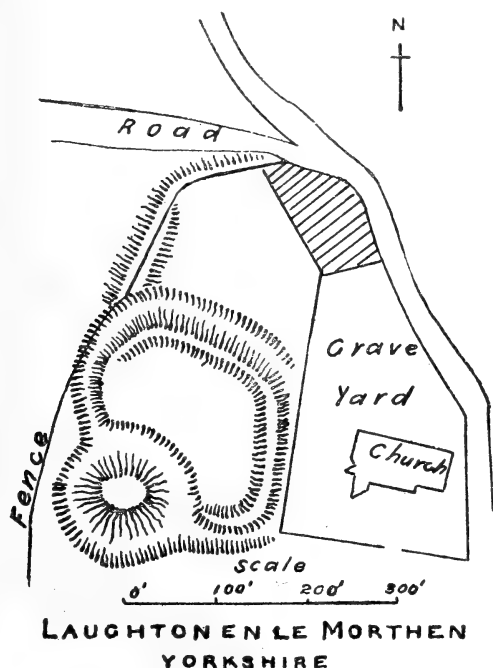
Ringed Plover on Nest.



chapters relating to the Britons, Romans, etc. Unquestionable remains of these people have been found on Ingleborough, but whether the author will prove his theory that the 'Hill was at one time a great centre of Roman civilisation, if not actually a citadel strengthened by a chain of surrounding forts, block-houses, and camps,' is another matter. Whilst there is much of interest in 'Old Ingleborough,' and we can recommend it, we must confess that it is somewhat irritating in parts from the frequency with which we are presented with what the author himself terms his 'garrulous outbursts!' One of the nine full-page illustrations is a photograph of the British canoe now in the Leeds Museum—one of its most valuable possessions.

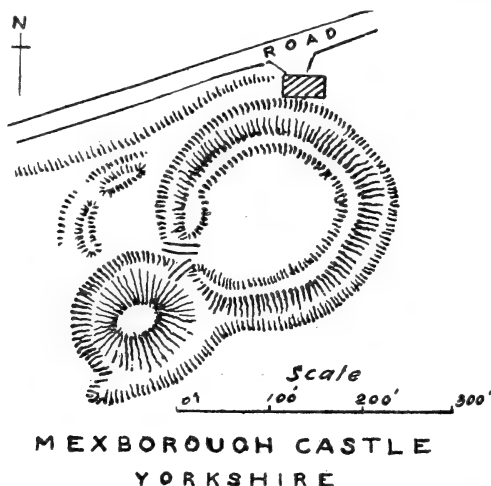
EARLY DEFENSIVE WORKS NEAR SHEFFIELD.

In a recent issue of the 'Journal of the British Archæological Association' Mr. I. Chalkley Gould gives an account of the early



defensive earthworks of the Sheffield district. His paper is accompanied by plans of the earthworks at Wincobank, Templeborough, Laughton-en-le-Morthen, Mexborough, Bromfield, and

Conisborough. Two of these we are able to reproduce by permission. Mr. Gould strongly urges the importance of preserving relics of this character. 'We all know, only too well, how many interesting relics of Celtic, Roman, Saxon, and later



periods have been ruthlessly swept away in the course of agricultural and other operations; landowners, farmers, builders, railway companies, and even the War Office have aided in the work.' It is pleasing to know that, at any rate, the pre-historic fortress on Wincobank Hill is to be preserved, having been presented to the City of Sheffield by the Duke of Norfolk.

MOLLUSCA.

Helix nemoralis L. in North-west Lincolnshire.—On p. 36 of 'The Naturalist,' 1905, I asked if anyone had ever found *Helix nemoralis*, 12300, in Britain, for it is not uncommon in Ireland. A few days before I wrote I had gathered some hundreds of shells from the freshwater alluvium of Kettleby Beck in this parish. They were unsorted when I wrote. Amongst them I find the variety *minor* (Moq.) + *conica* (Pascal) +(123)00. It is a slightly weathered and 'dead' specimen, which the Thrush had carried to the anvil stone, but not attempted to break. In my thirty years' experience this shell is unique.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 10th February 1905.

OBSERVATIONS ON SPIDERS AT RYDAL.

MARY L. ARMITT.

A CASUAL observer of Nature even cannot but be excited to curiosity by the doings of spiders. Secret of habit as they are, cunning in choice of some lair where they are closely concealed, largely nocturnal in habit, they are yet revealed by the snares they weave; and the beautiful orb-web, or sheet-web, or irregular lacy structure shown by the glistening of the morning dew, proves the activity of the hidden creature in the past night. Through the bright sunshine it waits in its den, while its toils (like the fishermen's nets laid at sea) do the work of catching and entangling its prey. Its odd power of weaving its snare from its own body, and even in many cases of constructing house and home from the same substance; the artful variety of its methods, its beauty, its speed, its seeming ferocity, all make it an attractive object of notice. And even an amateur like the writer, with no special knowledge on the subject, but helped by an expert to the names of the most obvious species met with in garden and neighbourhood, may gain sufficient acquaintance with them to make the renewal of that acquaintance each season a pleasure.

And there are some typical and interesting forms among the obvious species of the place, as will be seen by a recital of them. Perhaps it should be said, first of all, that the common or garden spider, *Araneus diadematus*, is conspicuous by its absence from the garden; and only the variety which Mr. Pickard-Cambridge says is found 'in the mountain rocky districts' has been taken from a large loose web on a neighbouring field wall. This fine species, whose immense and stout snares stand the force of the sea-breezes on the face of St. Bees Headland, has indeed been introduced into the garden. Two handsome specimens, whose time had been usefully spent in a garden near Liverpool, during a summer when wasps were numerous, in catching these pests, were placed in nasturtium plants to recall their former home. But they did not establish a race. One, at least, existed for a time, and in the following September had its home in the ivy by an upstairs window, and spread its toils and caught flies; but after the end of October, when it went into retreat, and tied a leaf down for seclusion, it was seen no more.

There are two species of spiders, however, that weave geometrical or orb-webs, very common in the garden. One

belongs to the house-face, which is constructed of the slate-stone of the district, set roughly without mortar or rough-cast. The innumerable crannies thus formed between the irregular stones serve as homes for a host of spiders, chiefly of two widely different species, a *Zilla* and an *Amaurobius*; though *Tegenaria derhamii* is also present. The *Zilla*, being an orb-weaver, and needing a fair open space for its toils, affects the window-corners and the wooden cornices; just as, on the dry walls of the fell, it or its fellow species takes the 'camming' at the top, while its neighbour of the *Amaurobius* tribe lurks in the narrow, dark chinks of the stones.

It is late May before the *Zilla* (probably **x-notata*) is seen to have taken its stand in the window corner, where every night it weaves a new, beautiful web. At first these webs are small, and being set, as they often must be, within triangular foundation lines, they do not attain a complete circle, but show merely two segments of one. Even when a large web is made by an adult spider, the concentric lines never meet, for it is the peculiarity of the *Zilla* species that it leaves one spoke of the wheel, or one radiating line, free. It is difficult to see why this is; but close below this free line a strong cord runs, connecting the centre of the circle with the creature's lair, upon which it runs out when a victim is caught. It soon weaves for itself, too, a little silken retreat or hood which hides its form from prying eyes of enemies, and serves to shelter the eggs when these are laid. As summer advances *Zilla* spiders begin to swarm, and for every nook of window or tangled creeper there are claimants. Young, eager settlers push out over the latticed window frame, which is cast in bronze, and seize each one on a diamond pane, 5 x 10 inches, which they hold as their own, constructing the web across its shallow setting. So exquisite and fine are these structures that they are invisible, except when the sinking sun strikes the glass. But about nine, if the evening be cloudy, and just at the time when Swifts make their last darts and doubles over the river after flies, the little spiders wake up, creep from the corners of the pane, and begin the night's adventures. Each is visible now against the light. One hangs motionless on the centre of an invisible, but apparently perfect web. Another, whose web, attached to the stonework, is shaking in the breeze, busies itself with repairs. Two others are in incessant motion, weaving. Their gyrations are ceaseless, first in an oblique direction, while the wheel is being formed, then round and round, for the concentric lines: though always at one

point they turn to leave the free line, for even the baby *Zilla* is true to the weaving-law of its species.

But this teeming population is thinned by the fortnightly window-cleaning, and no doubt by internecine struggles, and presently a few adults only are left in secluded corners, where they wax fat, till pairing and egg-laying time comes, which is in late September and October. Then the spider ceases to spin for a time and cunning Titmice become watchful, knowing quite well the edible worth of those egg-bags that lie shrouded within the lairs. In October both Great Titmouse and Blue Titmouse make systematic beats over the house-face, hanging to every ledge of it; and egg-bags are seen, nipped open and torn, with but an egg or two left in them. The spider, too, often disappears after these raids, and no doubt in many cases falls a prey to the bird. It has, however, an established method by which it seeks escape; for at a touch it falls straight down, curls its legs about it and feigns death. I once disturbed three specimens of *Zilla atrica* at home on a rock, and coming back after twenty minutes found them still lying still as corpses; and it was not until some minutes later that one began to move. But this subterfuge may bring the spider into fresh danger, besides losing for it its home. A *Zilla*, disturbed from the top of a wall, once fell on a projecting stone below that was covered by the flossy lines of an *Amaurobius*; whereupon the owner of the lines rushed out to secure its prey; and then, recognising a neighbour in distress, it magnanimously drew back.

The two species indeed dwell on amicable terms of live-and-let-live. *Amaurobius similis* covers the house-face in summer with the lace-like lines that it is peculiarly adapted by the number of its spinnerets to construct. It must be entirely a night-worker, and lives unseen, withdrawn in the crevices; except when some bold member of an overcrowded population pushes into a room, and ensconces itself behind the shutter, and then it is seen that even the small line of a young specimen is sufficient to entangle a house-fly.

But by the very excellence of its web as an entangling medium does the *Amaurobius* suffer. The hen Chaffinch, a most cunning weaver herself, has learnt the splendid adhesiveness of this stuff, and it and moss together often form the entire bricks and mortar of her exquisite nest. She is constantly seen in nest-time hanging to the house-face or creepers gathering it, and often places her nest within the creepers, that she may not have far to fetch it. Thus is the harassed cave-dweller robbed

of the fruit of his night-labour, and must often go hungry through the day. He is sometimes wanted himself, too, as well as his web. I have seen the Great Titmouse, in a season when caterpillars were scarce and nestlings growing, look so earnestly into an *Amaurobius* web that he was clearly wanting its owner; and the Blue Titmouse, in a season of dearth, will carry in the spider to its nestlings. Again, I have known the Robin feed its young just out of nest in late July very largely on this spider. The Robin is not a good acrobat like the Titmouse, and its tactics were these: it flew to the gutter of the porch as a vantage port, cocked its eye upon the upper house-face, flew up then to a selected spot, secured its prey, and carried it to the youngster hidden for convenience among the plants below. This action it repeated again and again, on several days.

The common orb-weaver of the garden—equally common, too, on herbage and wall outside—is *Meta segmentata*. In April its first web may be seen, and young members of the tribe continue to spin well on into December, if the weather be fair and mild. The web has an open centre or hub (a distinguishing feature of the *Metas*), then a few fine concentric lines spun upon the spokes, which are used as a framework for itself to hang upon; then a space where the spokes are left free; and finally the wide concentric lines which form the catching-ground of its prey. This spider, like some others, is tempted sometimes by a fair breeze to spin in the middle of the day. It is probable that the breeze assists the spinner in bridging spaces with the first lines that form the foundation, for then a thread emitted from its body will catch on some near object and serve as a ladder. A captured spider once remained stationary on the rim of a tumbler, holding the end of the abdomen upwards, until it turned and by a perfectly straight line ascended to the hat-brim of a person seated near. This it must have done by a line it had ejected which had caught that object; and thus, no doubt, do spiders often attain their first cross-ropes. The *Meta*, having secured the foundation and a few cross-lines, proceeds to the radiating spokes by crawling from the centre along one already achieved by this method, dragging a new line behind it. It then runs for a short distance along the outer foundation line, and attaches the dragging line to it; next it swings back to the centre on this line (which bows wide) and tightens it there. After making a sufficient number of spokes and pausing awhile, it creeps slowly round and round from the centre, attaching its line to every spoke it passes. When the few central concentric

lines are made, it goes to the circumference, and begins from outside the larger concentric lines.

The web is variously inclined, according to its position in the herbage. Sometimes it is horizontal; occasionally, when placed in a clump of day-lilies, among the tall narrow leaves, it is set on an angle, because the foundation lines and the spokes have not been carried out in one plane. I have seen a web, begun about seven o'clock on a June evening, finished in a little over half-an-hour, and the weaver by eight hanging to the centre, ready for business.

It may be often found, indeed, on the web. It makes no lair, but conceals itself in the herbage near the end of the strong cord that runs to the centre of the web. When disturbed it runs to a securer spot, and shoots out its two front pairs of legs, which are very long. By this attitude it perhaps hopes to persuade an enemy that it is not a spider, and possibly the subterfuge may deceive a bird, but is a little ludicrous to the human being who is watching. Doubtless it needs protection. I have known a well-established pair of *Metas* disappear suddenly, and the web so persistently kept up left torn and hanging. The male begins to appear in consort with the female in September, and lurks on the extremity of the web waiting her pleasure. He is bolder, however, and when the two are found out on the net together, will hold his own while she beats a retreat. Through October often the couples remain clinging to the garden plants, though autumn rains dash down their webs and chill and paralyse them. Finally they succumb to the approach of winter, like the plants themselves; and it is only on an evergreen or on a sheltered bank, that we find a stray specimen hanging out a weak web on a mid-December day. In this respect the *Zilla*, sheltered by the house, has a great advantage. So long as the weather remains open the *Zilla* continues to spin, even through January; and I reckon that it ceases to spin when the ivy ceases to flower, and that is when the first good frost sets in. This season exquisite webs of the *Zilla* were shown up on the house by the hoar frost of December 21st, and by the 26th there was skating on Rydal Lake.

It is perhaps on account of the unprotected haunts of *Meta segmentata* that it varies so considerably in colour. One autumn I found the spider's tints to range from ochreous yellow, through buffy or bright browns, to absolute red. Among the yellow *Rudbeckia* flowers the creature was ochreous, and in general the

colour was assimilated to the objects about, but it was singular to find that in the green mass of flowerless day-lilies it assumed its brightest and most jewel-like aspect of patterned scarlet. Perhaps, as it could not become green (like *Araneus cucubitanus*, that is as green as the lilac-bush of the garden it inhabits), it found a sparkling effect, as of broken sunlight, the best to produce. But if green is beyond the colour range of our *Metu*, white is not, for I have found a specimen living in a Japanese anemone-flower quite white in ground colour, below the pattern. Possibly the white spider we found some years ago living in a Grass-of-Parnassus flower of the fell-swamp was of this species also. In this case its pattern was just like the stamens of the flower, from which it was absolutely indistinguishable when at rest. In a case of this sort, it is interesting to consider how long a time is required for such assimilation of colour. The botanist says that the Grass-of-Parnassus requires from 15 to 20 days to go through its evolutions before its petals drop; the autumn anemone takes probably (having not so elaborate a system of stamen-extension) a much shorter time. Does the spider become white for a single flower, changing its colour when the petals drop; or does it, when this happens, seek by intention another bloom, and so extend its white existence with the whole season of the flower?

Even the *Zilla*, that lives in a hood, tones itself to its surroundings. Black-grey upon the rocks, with a white pattern that is like a lichen-stain, it assumes a red-brown tone up on my window-frame when this has been freshly painted. And this I imagine it does (though am not certain), in two or three days. Again, while *Araneus cucubitanus* is pea-green among its leaves, *A. cornutus*, when living on the bulrush flowers of the lake, is almost exactly like these. It has but, when disturbed from the hood or tube in which it lives, to crawl upon the bundle of brown, rounded flowers and draw up its legs, to be practically invisible; for its pattern is like the flecks of light upon the bundle. This fine, water-loving species is abundant on the lake-grasses of Windermere (male and female together late July); and multitudes of young ones may be found weaving their exquisite silken retreats on the rushes and gorse of Ennerdale shore in September, but so far I have not come across it on Rydal Water.

The most distinguished orb-weaver of the garden, however, is *Tetragnatha extensa*. For the presence of this species, a water-lover, too, we are probably indebted to the river Rothay,

which runs swiftly by. In a laurel bush of the bank, this singular, long-bodied spider has its home each year, and when June comes round I begin to look for the fine snares among the leaves, or turn over the leaf-backs to spy upon the weaver, who lies—long fore-legs extended straight out in front—like a long, dark stain (no living thing!) upon the green. About the middle of August the young ones are out and spinning for themselves; and I have counted as many as ten at work at once. The time varies from six to seven in the evening, and the web, like the *Meta's*, is completed in something over half an hour. The method of weaving is much the same, the worker occasionally precipitating itself on to a leaf below, to achieve a radiating line from the centre, which is marked by a good blob of gossamer. When one line is achieved, the spider does not proceed to the next, but goes to the opposite side, to preserve the balance of the web. If a line has been falsely placed it is altered. The spokes complete, a few fine concentric rings are made from the middle. Then the worker desists, and restarts from the circumference, running up a spoke until it is able to leap upon the next, and running down this with the line trailing behind, which it tightens and fixes to the required distance, and gradually working inwards till the space (unlike the *Meta's*) is completely filled with concentric lines. This spider's lithe springs from spoke to spoke give its web-spinning a gay, dancing character. If it finds, early in the process, that its centre is not true, it alters it. A web, measuring 7 to 8 inches across, with stay lines of some 10 inches, is finished in the time mentioned.

Tetragnatha extensa makes no hood, but relies on its attitude, with four legs extended straight out in front and four behind, to evade the sight. It is very cute in the disposition of its legs. I took up one whose web hung in a *Phlox* plant, and after examination replaced it there: whereupon it did not hide under a leaf, but crept upwards, and with its hind legs it clasped the pistil of the flower (from which the petals had fallen) and placed its front legs straight out in air, and rested so, the legs looking just like the fine stamens of the flower. Such an intelligent adaptation to special environment was equalled by a white butterfly in spring, which, after fluttering gaily about the garden, chose not only the white flowers of *Ranunculus amplexicaulis* to rest upon, where it was merged in the mass, but a special flower of the clump from which the petals were half fallen, and where it seemed to complete the scheme of colour.

The *Tetragnatha* loves, too, the rills of Loughrigg, and in late May and early June, when the butterwort and the cotton-grass are out, it may be found early on cloudy evenings hanging upside down on its web, stretched from marge to marge of the running water. But as these fine specimens are yellow-banded below, they may be of the fellow-species, **T. Solandri*.

When we come to the sheet spinners, we find it is *Linyphia triangularis* that is the common species of garden and neighbourhood. The webs begin to show at the end of May, and presently the Irish yews and the evergreens are decked with these close, finely-wrought sheets. They are wrought in the night, and I have only once seen a spider at work in the junipers of the fells, and then the method in its hither-and-thither running could not be detected. The sheets are generally stayed by strong lines from above, to resist the push of the winds; and yet I have seen them swayed dangerously by a breeze from below. They are sometimes twelve inches in length, and are crossed by a thousand lines, so that the texture is almost dense. This species, delicate in shape compared with the orb-weavers, is frequently seen upside down on the web, and in the eagerness of pairing time (August) the two sexes may be caught together. Placed in a tumbler, they make no attempt to escape, but after constructing the necessary lines by which to suspend themselves, spend the time in mutual engrossment. It is the male who takes the lead in line-making and who hangs at first from the top ones in proud supremacy, while the female meekly waits below; at the end of a few hours, however, the position is reversed, she is at the top, and he is crouching to the side below. The allied species, *Linyphia montana*, has been taken by a friend's sweep-net from the lake shore.

A more remarkable *Linyphia* of the garden is *marginata*, which, according to Mr. Pickard-Cambridge, is peculiar to a mountain district. For some years it had its home in an Irish yew, where the great sheets it spread quite early in the season between the tree and paling attracted attention. Presently the spinner was discovered in the tree, a fine spider, whose abdomen, larger than the usual *Linyphia*'s, showed a dark pattern on a white tessellated ground. The more slender male, too, was presently seen, and the season of maturity seemed altogether earlier than that of *L. triangularis*. But for two years, alas! I have looked in vain for this spider. Perhaps the increasing dust of the high-road, caused by the motor-cars, has banished it from its old haunt, and I have discovered no new one.

Linyphia pusilla lives by the lake shore. On 14th May, after hot weather, I found a young female out on a web which she had constructed between the small stones left dry by the lowness of the water. *L. cauta* I have taken from its web in late June, in the damp dark rocks by the Rydal Falls.

Towards the end of June the morning dews show numbers of tiny sheet-webs set in the lawn grass almost close to earth. Perhaps these are the work of the small ant-like *Erigone nigra*, which is often met with in the grass.

The *Theridion* spiders, that construct irregular webs of criss-cross lines, are most interesting to watch in their domestic arrangements. Of this genus, *denticulatum*, *lineatum*, and *sisyphium* live in the garden. The latter may be found in July in the full swing of household duty. The web is set perhaps in an Irish yew (a favourite bush with spiders), and towards the top of it, under a twig, a special shelter or wigwam is arranged, which is made up of the dried carcasses of flies slaughtered in the snare. Under this the mother-spider, patterned in ruddy brown, may be seen resting in the day, with some spiderlings running about her. Occasionally she may be caught out, tempted by a great fly in the centre of the web, which with enormous labour (for it is larger than herself) and much damage to the web, she drags to her retreat. As she nears her goal, the little ones, eager perhaps for food, run out on the fine strands to meet her. Once I brought a *Theridion* and her wigwam (within which could be dimly seen the egg-bag) from the fell into the garden upon a juniper-tip, and tied this to the spike of a tiger-lily—a position voluntarily chosen by another of the species. But the little mother, who made no attempt to escape, was by no means satisfied with the arrangement. In the morning she had abstracted the precious ball of grey-green silk, and was found to have carried it under a lily-leaf. But that would not do: in a few hours it was back under the juniper-twigg, and well hidden; by evening it was out again and round the stalk. Finally, after several trials of places, she settled under the leaf first tried, constructed a snare about the flower-buds and leaves, and by the evening of the second day had the satisfaction of carrying up the first victim of her toils, which would serve both as food and covering.

Many spiders appear to care for their young during infancy. Even the *Lycosa* or wolf-spiders, that make neither web nor lair, but live by the chase, do so. Their special difficulty in being homeless is got over by carrying the egg-bag constantly

with them, attached to the abdomen, a position in which it seems not to inconvenience their movements in the least. The females appear encumbered with this baggage in the first days of June. On 16th July last year I came upon a number of *Lycosas*, sunning themselves, as they love to do, on a patch of dry leaves in the wood. They carried the usual egg-sac, against the pale grey of which their dark abdomens were sharply defined. But a few of them showed less sharpness of outline; the silken cover of the bag seemed broken, and the spider's body was clouded with a grey film. It needed a magnifying glass to disclose the state of affairs. The crisis had arrived, and the eggs hatched out. The shell of the bag was cracked, and a number of tiny spiders had crept on the mother's back, where their looping, transparent legs and minute bodies, fitted together tightly, gave them the appearance of chain armour. I saw one infant crawl out of the bag, slowly upward, and fit itself against the others. Strange instinct, that without direction could cause the little creature to assume a position of safety and warmth, till it was strong enough to fight the battle of life for itself!

Ground spiders are justly held in awe by creatures like themselves. I once saw, on the Marsh, three little spiders rush up grass-blades and hang there motionless while a striped ground-spider passed, after which they returned to the sward and were lost in it. I have found **Salticus scenicus* in winter under the bark of an old tree in the parrock, and *Enophris erraticus* in the garden. *Xysticus cristatus* I have taken on the fell.

Besides the spiders already mentioned, *Clubiona terrestris* lives in the garden, and *Pachygnatha degeerii*, *Dictyna arundinacea* in the junipers of the fell, *Meta merianæ* under cavernous rocks in the park. *Lepthyphantes tenuis* I have taken there, too, male and female, at the end of June; and *L. flavipes* elsewhere. *Pardosa pallata* has been taken. The queen of orb-weavers, **Araneus quadratus*, has been brought to me from the heather near Hawkshead Hill.

[The spiders mentioned in this paper have, with a few exceptions, been most kindly identified for me by the Rev. F. O. Pickard-Cambridge. These few are marked with an asterisk.]

The Gamekeeper's Pole, Cadney, Brigg, Season 1904-1905.—105 Weasels, 55 Stoats, 1 Polecat, 24 Domestic Cats, 20 Magpies, 12 Carrion Crows, and 4 Sparrow Hawks. The Rats have not been carried to the pole this year.—E. ADRIAN WOODRUFFE-PEACOCK.

THE YORKSHIRE BOULDER COMMITTEE AND ITS EIGHTEENTH YEAR'S WORK, 1903-4.

PERCY F. KENDALL, F.G.S., *Chairman*,

AND

H. HOWARTH, F.G.S., *Hon. Secretary*.

THE records during the year are less numerous than usual, but the Committee now only wish reporting erratics from new areas or localities, or such as add support to previous records from places where erratics are scarce, or new rocks altogether.

The rocks reported by Mr. Kendall from Norfolk are appended to this report because they indicate the extended distribution of erratics familiar to Yorkshire recorders. They are further of much interest to us as a number of them were identified by Professor Sjögren and Professor Bäckström, of Stockholm, as of Scandinavian origin.

These rocks included a cancrinite-syenite from Särna in Dalecarlia, Sweden; quartz porphyry, also from Dalecarlia; a fine-grained granitic rock which is a common and widespread type in Sweden; sparagmite conglomerate from Scania; sparagmite sandstone and a series of hornblende-porphyrates from the Christiania districts.

Reported by E. HAWKESWORTH.

BROMPTON AND OSMOTHERLEY.

Between Brompton and Osmotherley, three miles N.E. of Northallerton, in sandy clay exposed in altering road. Whin Sill, Shap granite, Lake District Volcanic Series (several varieties), Carboniferous limestones and sandstones numerous. Chert.

HULL GEOLOGICAL SOCIETY.

BOULDER COMMITTEE.

Reported by G. W. B. MACTURK.

RAYWELL, NEAR HULL.

In connection with the making of the new reservoir at Raywell a section has been exposed consisting of Boulder Clay, 10 feet thick, resting on Chalk, 230 feet O.D. The boulder clay appears to be in two divisions, a red upper clay and a blue or lead-coloured lower clay. Among the erratics the following were recognised:—Carboniferous Limestone, Ganister, Porphyrite, Greywacke, Basalt, etc.

1905 March 1.

SOUTH CAVE.

In the field adjoining the railway, 300 yards east of the railway station:—Carboniferous Limestone, Lower Lias, Soft Yellow Sandstone, Ganister, etc.

Reported by THOS. SHEPPARD, F.G.S.

KILNSEA, NEAR SPURN.

Two Mammoth teeth.

Reported by J. E. HALL.

THIRSK.

In the town gravel pit, fragment of *Pecten*.

QUARRY, NEAR LANGHAM.

Brown boulder clay, with dolerite, oolitic limestone, Carboniferous Limestone and chert, Millstone Grit, Trias pebbles and flints.

NORFOLK.

Reported by P. F. KENDALL, F.G.S.

BEACH FROM CROMER TO MUNDESLEY.

Rhomb porphyry; laurvikite (two varieties); cancrinite-syenite of Särna, Dalecarlia, Sweden; quartz porphyry, Dalecarlia; fine-grained granite, Sweden; sparagmite sandstone, Scandinavia; sparagmite conglomerate, Scania, Sweden; hornblende-porphyrityte, Christiania district, Norway.

GEOLOGY.

Lincolnshire Boulders.—Mr. C. B. Parker, Irby, has furnished me with chippings and particulars of the following boulders:—

1. Carrock Fell Gabbro.* 2 ft. 1 in. × 1 ft. × 10 in. Nearly half a mile south of Irby-on-Humber Church.
2. Whin Sill. 2 ft. 4 in. × 1 ft. 6 in. × 1 ft. 5 in. Seven furlongs south of Irby-on-Humber Church. A groove about seven inches wide and one inch deep, and extending the full length, occurs in this boulder, suggesting that for some time this stone was fixed, and the groove worn by other passing boulders.

The first was turned up by the plough, November 1904, and the second December 1902. Both occurred above the 200-ft. contour line. I enclose chippings.—A. SMITH, Grimsby.

* This appears to be the first record of this rock for the county.—EDS.

THE GEOLOGY OF SCARBOROUGH DISTRICT.*

THE district around Scarborough is almost unrivalled for its scenery and in geological interest. The valleys and tabular hills inland, and, where the land meets the sea, the effect of the grand cliffs in opposition to the sea, is extremely fine.

The rocks of the coast seem to have been arranged for the 'convenience of geologists,' the general southerly dip of the rocks forming the cliffs bringing each formation from Chalk to Lias within comparatively easy reach, some of the beds being exposed in such a manner as to present a very fine feature; notably the Chalk of Flamborough and Speeton Cliffs; the Calcareous Grit of Filey Brigg and the Red Cliff of Cayton Bay; amongst many other points of interest, which are also not lacking inland as well as on the seaboard, as the conical hills of Langdale End and Blakey How, in Kimeridge Clay, Calcareous Grit and Oxford Clay; the curious Bridestones of Staindale Beck; the steep-sided Forge Valley, cut in a bend of the River Derwent's old course, to afford relief from glacial oppression; well testify.

In addition to the inherent interest of the district, it is classic ground, and will always be associated with William Smith, the first 'geologist,' and John Phillips, whose works hold their own to-day in spite of the feeble light of the time in which they were written. It is not surprising that the geologists of East Yorkshire are, or should be, somewhat enthusiastic, and it is not to be wondered at that so accomplished a geologist as the author should make the most of the privilege of writing the Memoir of this district.

The volume describes the district covered by sheets 54 and 55, new series (98 S.W. and 95 S.E., old series), besides bringing the work up-to-date, it is much more comprehensive than the first edition. The addition of excellent photographs with diagram transparencies and many (though poor) palæontological illustrations and sections, not only add to the interest of the work, but considerably enhance its educational value, clearly showing points that words would inadequately describe.

* The Geology of the Oolitic and Cretaceous Rocks South of Scarborough (Geological Survey Memoir), by C. Fox-Strangways, F.G.S. Second Edition. 1904. 4s. 6d.

In the introduction it is stated that 'these few pages' (some 119) 'are intended to give a short sketch of the leading geological and physical features comprised in Sheets 54 and 55 of the Survey Map,' and for further details the reader is referred to the 'Jurassic Rocks of Britain,' Vols. i. and ii. Of course, anyone who knows the author will be prepared to find what really is the case, that the 119 or so pages contain an interesting and fairly full account of the district, and, what is more to the point, it will bear examination. It is indeed quite refreshing, in these days, to read such solid and accurate work, when so many geological treatises appear to have been written in an arm chair with the assistance of a fossil map or two.

But a memoir is not intended to be a mere sketch (although to judge by the ridiculous flimsiness of the paper cover, the contents might be intended to serve an even lighter purpose than that), and it would have added to the value of the volume if the Plant Bed of Gristhorpe Bay had received a little more than passing mention. While it is not to be expected that such a feature could be exhaustively treated in this work, especially in view of the published treatises dealing with this bed, a little fuller treatment would have brought it more into line with the rest of this excellent work.

The Kimeridge Clay has had its fauna considerably extended by Mr. C. G. Danford, who has added to the list of Belemnites since this work was written, and the same remark applies to the Speeton Clay.

The reference to the 'Portlandian' is not quite clear, or perhaps it would be better to say, is somewhat hypothetical.

The chalk is succinctly dealt with, but in five pages it could not be expected that more than a somewhat condensed summary of the chalk literature and the author's observations could be compressed into so small a space, consequently many features of this formation have had to remain undescribed. It is stated that 'Dr. Rowe is now working at the Palæontology of these beds.' Dr. Rowe has since published his 'Zones of the White Chalk of the English Coast, Part IV., Yorkshire,' an excellent work considerably extending the fauna of this formation and throwing light on several lithological and physical features.

The Superficial Deposits are well described in the all too brief six pages allotted to these interesting beds. The Boulder-clay, with its extensive range and remarkable development, would require a volume to adequately deal with so interesting

a subject, but the reader has to be content with part of one page, in spite of the fact that so very little has been written on the glacial remanié of this district.

Under the head of the 'Sands and Gravels of the Vale of Pickering,' it is stated, 'it is possible that these Gravels' (i.e., the Hutton Buscell Gravels) 'are the remains of an old raised beach'; these beds are also referred to on page 99 under the head of 'Physical Structure,' where reference is made to Professor Kendall, attributing 'deltaic' origin to these Gravels, and the writer disagrees with this theory, but waives discussion in this work, although it is difficult to see why the 'raised beach' theory is less controversial than that of their 'deltaic' origin, and there certainly seems to be a preponderance of evidence in favour of the latter.

The description of the diversion of the Derwent and the Vale of Pickering river is very ably written, but the reference to the thicknesses of the Boulder-clay and height of Glaciation is somewhat difficult to understand.

The printing and general get-up of the work is very good and a marked advance on its predecessor (except as regards the tissue paper cover), but the memoirs of the Geological Survey might be improved in appearance if funds permitted an idea or two being taken from the U.S.A. Memoirs.

This new and enlarged edition will be a great boon to all, and especially local Geological students, and cannot fail to give a considerable stimulus to the study of the Geology of Scarborough and district.

C.

CRYPTOGAMS IN THE GRIMSBY DISTRICT.

A. SMITH, F.L.S., F.E.S.

WITH a view of obtaining further notes on the cryptogams of the area, Mr. J. Reeves and myself visited Roxton Wood, 8th October 1904, working the portion situated in the Parish of Brocklesby. There are numerous species of trees, but chiefly Fir, Pine, and Oak, the latter of which are very much galled; millions of the tiny discs of the spangle gall lie on the ground and among the leaves beneath the trees. The wood is of the damp kind and very prolific in flowering plants during spring and summer, and is a fairly good locality for Fungi, a quantity of which was gathered and sent to Mr. Charles Crossland, F.L.S., whose kindness in naming the species we beg to acknowledge.

MOSSES (verified by Miss S. C. Stow).—*Dicranella heteromalla*, *Catharinea undulata*, *Fissidens taxifolius*, *F. bryoides*, *Hylocomium triquetrum*, *Mnium undulatum*, *M. rostratum*, *Thuidium tamariscinum*, *Eurhynchium piliferum*, *E. prælongium*, *E. striatum*, *Plagiothecium denticulatum*, *Hypnum cupressiforme*, *Neckera complanata*, *Amblystegium serpens*, *A. filicinum*, *Brachythecium rutabulum*.

HEPATICS.—*Cephalozia bicuspidata*, *Kantia trichomanis*, *Lophocolea bidentata*, *Pellia calycina*, *P. epiphylla*.

FUNGI.—*Lycoperdon pyriforme*, *Amanita rubescens*, *Tricholoma rutilans*, *T. terreum*, *T. personatum*, *Clitocybe nebularis*, *C. trogi*, *C. brumalis*, *C. laccata*, *Collybia numularia*, *C. butyracea*, *C. dryophila*, *Mycena rugosa*, *M. galericulata* var. *calopoda*, *M. sanguinolenta*, *M. galopoda*, *M. epipterygia*, *Pleuteus cervinus*, *Entoloma sericellum*, *Nolanea pascua*, *Pholiota mutabilis*, *Inocybe rimosa*, *I. asterospora*, *I. geophylla*, *Hebeloma fastibile*, *Galera tenera*, *Tubaria purpuracea*, *Agaricus sylvaticus*, *Stropharia æruginosa*, *S. albocyanea*, *S. semiglobata*, *Hypholoma sublateralitium*, *H. fascicularis*, *H. lacrymabundum*, *Psilocybe fæniseeii*, *Psathyra corrugis*, *Psathyrella atomata*, *Lactarius turpis*, *L. quietus*, *L. blennius*, *L. glyciosmus*, *L. volemus*, *L. subdulcis*, *Russula nigricans*, *R. cutescens*, *R. cyanoxantha*, *R. ochroleuca*, *R. fragilis*, *Panus conchatus*, *Boletus badius*, *B. piperatus*, *Polyporus fumosus*, *Polystictus versicolor*, *Fomes annosus*, *Poria vaporaria*, *Stereum hirsutum*, *S. purpureum*, *Xylaria hypoxylon*, *Ciboria ochroleuca*.

LICHENS.—*Evernia prunastris*, *Parmelia phyodes*.

Additional species of Fungi found on Humberstone foreshore, 27th October 1904 (Dr. Wallace; A. Smith).—*Lepiota excoriata*, *Entoloma sericeum*, *Galera hypnorum*, *Anellaria separata*, *A. fimiputris*, *Panæolus campanulatus*, *Hygrophorus pratensis*, *H. niveus*, *H. psittacinus*.

ADDITION TO THE YORKSHIRE LIST OF LEPIDOPTERA.

T. ASHTON LOFTHOUSE,
Middlesbrough.

***Ephippiphora grandævana*.**—I took a specimen of this insect on the banks near Redcar in July last. This insect is noteworthy as being an addition to Mr. Porritt's 'List of Yorkshire Lepidoptera.' I have previously taken odd specimens on the Durham side of the Tees.

MARINE EROSION IN THE WHITBY DISTRICT.

J. T. SEWELL.

LIAS SHALE CLIFFS.—The sea wears these away but slowly.

OOLITE SHALE CLIFFS.—These are more liable to be wasted by the sea's action than are the Lias. Wind and frost are certainly more effective in wearing away these cliffs than is the sea.

Where the cliff foot or shore is formed of level shales the Lias frequently stands out some yards in front of the perpendicular cliff rising above it; the sandstones from above as they fall gradually wash into deeper water.

CLAY CLIFFS.—The solid blue glacial clay is only slowly wasted by the water, especially when compared with the red boulder-clays. The surface drainage percolates into the vertical cracks formed in the cliffs, and not infrequently brings them down very rapidly. The cause of the subsidence of clay cliffs is either due to the want of surface drainage or to allowing such drainage to run over the cliff face. When once the angle of resistance is formed the sea has little power, especially if the shingle foot is groined.

SAND AND SHINGLE.—Both sand and shingle appear to be decreasing in quantity along this coast, thus giving the waves better access to the cliffs. There are two great causes of sand diminution. 1st.: The Tees dredging, which carries the natural river spoil into deep still water, and thus prevents the flood tides depositing it upon our coast; also this same deep Tees mouth catches the littoral detritus ever washing south along the Durham coast—the waste of cliffs and of rivers, the latter, like the Tees, not having been dredged until comparatively recent times. 2nd.: The other cause that has reduced the amount of shingle on this coast is the stoppage of alum working some 40 or 50 years ago. When this trade was flourishing at Boulby, Kettleness, Sandsend, and at Saltwick, an immense quantity of burnt shale and waste earth was shot over the cliff; the failing of this supply, which had been feeding the sands for 200 years, is now having a marked effect in many of the smaller bays. In Sandsend bay it is probably this cessation of supply, coupled with the lowering of the surface rock by a depth of 6 ft. over a large area outside the Ness point when blasting for jet some 30 years ago, that has lowered the sand level some 12 feet and caused the North Riding County Council to build a retaining

wall and to erect groins in order to protect the village and highway. Again, the using of shingle as ballast by the Staithes fishermen—the bags being constantly emptied into deep water—in the writer's opinion is having very serious consequences. When the sand from the west shore at Whitby accumulates at the river mouth and by the action of a strong northerly gale is deposited on the scaur to the east of the harbour and between the pier and Saltwick, it never gets back to the north or west of Whitby again but is washed into deep water southward. Both here and at Staithes there is a sudden drop of 30 or 40 feet to the sea bottom just at the point of low water.

This sand drift to the south and east has probably been going on for hundreds of years. Why, then, is it only within the last 20 years that the decrease of sand has been so marked between Whitby and Sandsend—a distance of 3 miles—unless the Tees dredging and the non-working of the alum shale are in some way responsible?

It is only during the last three years that the sand has covered the rocks at the cliff base on the east side of Whitby harbour, the oldest resident not remembering a deposit continuing so long at this place. Something has caused the sand to deposit here.

Deep water approaches to near the cliff in many places along the shore. This is frequently caused by the sea wearing a channel into the rock along the line of some fault in the shale formations. These tongues of deep water drain the shore of sand and of the debris that falls from the cliff.

Whitby harbour has probably less sand in it than at any time since 1765, when we read of 'the sand almost everywhere being totally scoured away' consequent of the first lengthening of the piers (Charlton). A few years later Scoresby writes that the sand washing into the harbour lay along the west side from the pier head to the other side of the bridge.

The dredging operations of a few years ago removed an immense quantity of spoil out of the harbour, depositing it into deep water, and though the river bar is not improved, still the mud and sand on the river banks have been decidedly lessened since the dredging took place.

At Staithes the harder nodules of limestone in the Lias shales of the shore stand up like little tables from the flat scaur, not unlike gigantic mushrooms. The softer portions of the horizon have been washed away, and while this was taking place ever recurring tides have washed the sandstones falling from the

cliffs above to and fro, until the nodule or the softer rock in which it is embedded is worn away as an ever narrowing pedestal. In some cases masses of sandstone that have long since fallen from the cliff and rested in some fissure or depression on the shore, are now supported upon a column of shale some feet above the present shore level.

FIELD NOTES.

BIRDS.

Golden-eye Ducks at Horncastle.—A small flock of these, five or six in number, have been frequenting the river Bain, about two miles northwards of Horncastle during the latter part of December 1904 and January 1905. This bird is rarely seen in these parts.—J. CONWAY WALTER, Langton Rectory, Horncastle, 1st February 1905.

Correction, Page 60, ante.—It is inexplicable how so many mistakes should have crept into this paragraph. As has been pointed out by Mr. Booth (Bradford), Hen Harrier should be MONTAGU'S HARRIER, Baildon Moor should be BARDON MOOR, and obviously East Yorkshire should be WEST YORKSHIRE.—S. L. MOSLEY.

LEPIDOPTERA.

Micro-Lepidoptera added to the Cleveland List in 1904.

—*Scoparia murana*, *Mimaseoptilus plagiodactylus*, and *Crambus margaritellus*, Great Ayton; *Crambus perlellus*, *Anerastia lotella*, and *Sciaphila virgaureana*, Redcar; *Sciaphila pascuana*, Eston Hills; *Clepsia rusticana*, Glaisdale; *Ephippiphora cirsiaria*, Kilton Woods; *Blabophanes rusticella*, Great Ayton and Eston; *Gelechia longicornis*, Eston Hills; *Lita maculea*, Glaisdale; *Lita marmorea*, Redcar; *Glyphipteryx fuscoviridella*, Great Ayton.—T. A. LOFTHOUSE, Middlesbrough.

COLEOPTERA.

Wintering Habits of the 7-spot Lady-bird.—For the last three months I have observed numerous 7-spot Lady-birds (*Coccinella 7-punctata* L.) on the branches of some Gorse bushes on the north slope of a hill-side. They seem to be in a dormant state (legs tucked in), and drop to the ground if touched but slightly. They are to be found singly, or in small clusters of

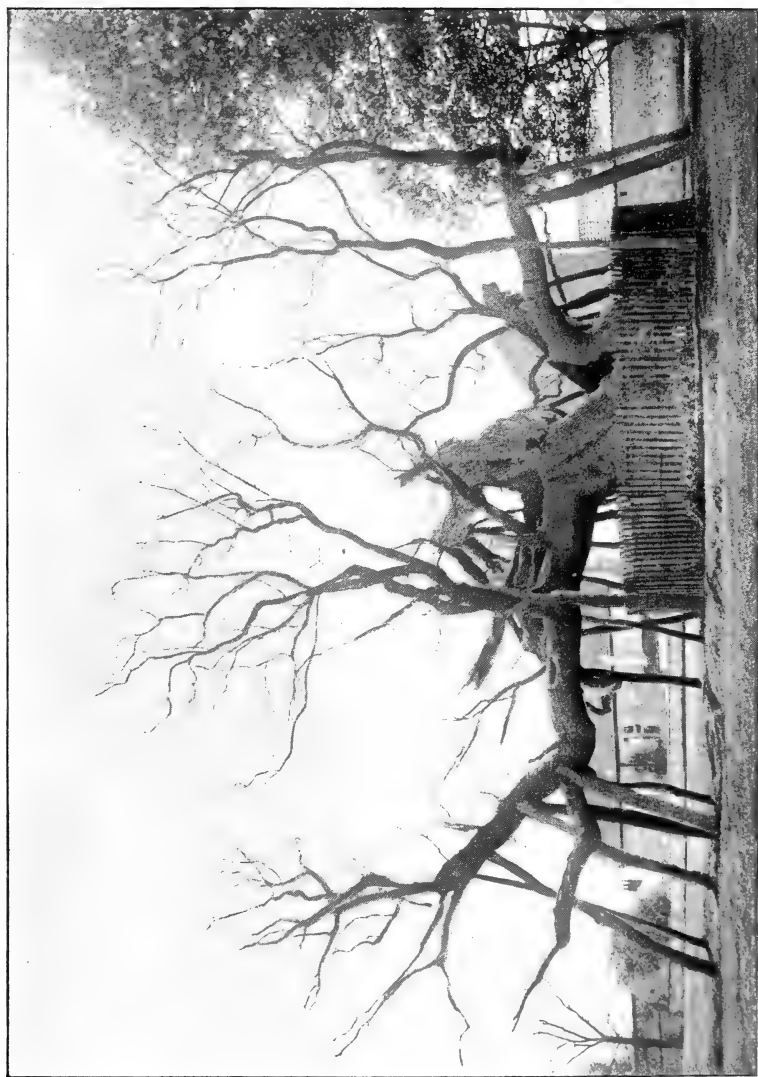
from two to about eight individuals, clinging to each other's backs ; but they are less numerous and more dispersed than when I first noticed them at the end of October 1904. When put in a warm place they soon become active, though I have not seen any movement amongst those on the bushes even on a mild day. When a strong wind is blowing they seem to be on the unexposed side of the branch. I do not know whether they move round according to the direction of the wind, or whether they choose the side away from the prevailing wind when they settle down for the winter. I should like to know whether it is usual for Lady-birds to spend the winter in this way? Also the advantage of crowding together into a cluster?—MARGERY H. BRIGGS, Otley.

[Kirby and Spence (Introduction to 'Entomology,' Vol. II., pp. 437-441), in discussing the hybernating habits of insects, say, 'Occasionally . . . several individuals of one species as . . . several *Coccinellæ* are found crowded together That it is not wholly accidental seems proved by the fact that such assemblages are generally of the same genus and even species.' The very favourable autumn of 1904 was productive of immense numbers of the 7-spot Lady-bird, and after such seasons the clustering habit is not unusual.—E. G. B.]

REVIEWS AND BOOK NOTICES.

THE COWTHORPE OAK.

When the members of the Yorkshire Naturalists' Union visited the Cowthorpe Oak, in May 1903, they had the use of a manuscript containing an account of the Oak (as well as of other large trees in the country), which had been written by Mr. John Clayton. This contained a complete history of the trees from all available sources, as well as measurements taken at different periods. The Botanical Society of Edinburgh has recently published Mr. Clayton's paper in its 'Transactions,' and has thus put upon record some most valuable information, relating not only to the Cowthorpe Oak, but to other giants in the vegetable world. Photographs of several of the trees are also reproduced by the same society, to which we are indebted for the loan of that illustrating 'the largest in diameter of all Oaks,' reproduced as Plate III.



The Cowthorpe Oak.







T. PETCH, B.A., B.Sc. (Lond.).

Transactions of the Hull Scientific and Field Naturalists' Club for the Year 1904. Vol. III., Part II. Edited by **Thomas Sheppard, F.G.S.** Price 2s. 6d. net. 1904. Pages 121-188 (plates).

This, the latest part of these valuable transactions, is abundant evidence, if, indeed, such were needed, of the vigorous scientific life of the society responsible for its issue. The larger portion is taken up by a full account of the 'Land and Freshwater Mollusca of the East Riding,' by T. Petch, B.Sc., B.A. The arrangement and painstaking minuteness constitute a praiseworthy model of what lists of this kind should be, and when to these are added, as here, a series of clearly-executed plates showing the geographical distribution of species, the value of the list is increased and the interest of the non-conchological reader aroused. A portrait (see Plate IV.) and life-sketch of the author, who is on his way to Ceylon as an official mycologist, are amongst the other good things which this part contains.

It is interesting to find also a list of various aquatic larvæ found in the Hull district. Too often we have to deplore the neglect of the immature forms of insects even in the best studied orders. Here, on the contrary, Mr. Foster deals with the larvæ of several species of Diptera and Trichoptera, two orders little studied and bristling with difficulties above the average. Last, though not least, but relatively the most important, is an account of the discovery of a Roman villa at Harpham.

The scientific world in general, and antiquaries in particular, may congratulate themselves that the few tesserae first turned up by the plough were brought to the notice of Rev. C. V. Collier, F.S.A., who, with Mr. Sheppard, the writer of the account we are now considering, have so successfully recovered the whole pavement, besides securing other interesting fragments, ornaments, coins, etc. Not less deserving of their thanks is the owner of the land in which these remains of the Roman occupation had for so long lain. With that high consideration, which we are pleased and proud to acknowledge, landowners in Yorkshire have invariably exhibited towards scientific research, Mr. W. H. St. Quintin, J.P., not only assisted the excavations in every possible way, but presented the whole of the finds to the Hull Municipal Museum. Of the great value of this discovery there is no room to doubt; did any exist the beautifully-executed plates would at once remove it. To these latter, which we understand are the work of Mr. Stainforth, we would draw special attention.

The Society is to be congratulated on the high level at which its 'Transactions' are kept. While dealing exclusively with the East Riding, their value and interest are by no means local and evanescent. The scientists and field naturalists who desire to keep abreast with the times cannot afford to ignore them.

E. G. B.

A Treatise on the British Freshwater Algæ. By **G. S. West, M.A., A.R.C.S., F.L.S.** Pages xvi. + 372, illustrated. 10s. 6d. net. University Press, Cambridge.

This treatise, which gives an account of organisms with which the author is thoroughly familiar, will be welcomed by all students of Algæ. One-tenth of the book is taken up with a biological introduction, and the remaining nine-tenths is devoted to systematics. The latter portion of the book is almost beyond criticism: in fact, it may be doubted if any British botanist (other than the author's father) is competent to criticise more than detached portions of it. The descriptions of genera with which the present reviewer is familiar are straightforward, clear, and accurate; and Mr. West is not to blame if in the

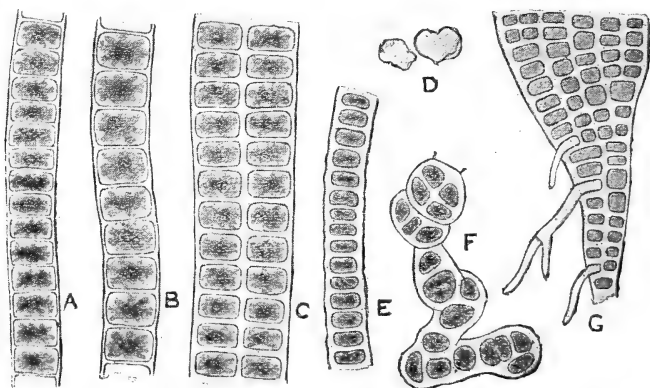


Fig. 36.—A-C, *Prasiola parietina* (Vauch.) Wille, from Bradford, W. Yorkshire ($\times 500$). D-G, *Prasiola crispa* (Lightf.) Menegh.; D, examples from Bradford, W. Yorkshire (nat. size); E, simple filament from Helvellyn, Westmorland; F, portion of irregular filament from Wimbledon Common, Surrey ($\times 500$); G, basal portion of broader thallus, from Bradford, W. Yorkshire ($\times 400$).

future a student of British Algæ is unable to place within the precise limits of a genus any Alga he may find in the freshwaters of the British Islands. Still, there are occasional slips, as when the filaments of *Sacheria* are stated to be 'little branched' as

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opposed to those of *Lemanea*, which are described as 'very branched,' whilst the figures (Fig. 3, A and C) indicate the reverse. The illustrations are careful and accurate drawings to scale, and are in no sense diagrammatic (one of which we are kindly permitted to reproduce), though the cell-contents of some of the half-tone figures are not shown, e.g., the 'granulations' of *Botrydium granulatum* (Fig. 122, B and C). The author enters with fulness into the intricate—and thankless—questions of synonymy, and British botanists will note many changes in nomenclature. The biological introduction, on the other hand, is not nearly so satisfactory as the systematic portion of the book. It is too brief; and as a result the author's discussion of several important problems suffers considerably. In particular, Mr. West does not do himself justice when stating his views on phylogeny. In criticising the classification of the Green Algæ put forward by Messrs. Blackman and Tansley, the author's statements simply amount to his pitting his own authority against that of Messrs. Blackman and Tansley. A lengthened introduction would enable the author to state his reasons in full; as it is, his discussion consists of assertions, sometimes stated 'most emphatically.' Still, the major portion of the book is of such a high standard of excellence that every student of Algæ must possess himself of the work; and we hope that a second edition will early be demanded, when the one serious weakness may be remedied. For the sake of the not very advanced students who will use the book, full explanations of the frontispiece (illustrations of the plankton of Lough Neagh and of Loch Ruair, Sutherland) and of the phylogentic table on page 30 are highly desirable. The book is well indexed as regards plants and authorities, but not as regards subjects, such as hybrids, movements of Oscillatoriaceæ, saprophytes, etc., etc.

The writer has been enabled to look over a recent paper* on the Blue-green Algæ, wherein the movements of the Oscillatoriaceæ receive an explanation not mentioned in Mr. West's book:—'The movements of *Oscillaria*, *Cylindrospermum*, and the other forms of the Cyanophyceæ which exhibit motion, are caused by delicate protoplasmic cilia distributed along the sides of the trichome.'

C. E. M.

* A Comparative Study of the Cytology and Movements of the Cyanophyceæ. By O. P. Phillips. (Contributions from the Botanical Laboratory of the University of Pennsylvania, Vol. II., No. 3, pp. 237-335, 1904, illustrated.)

Birds in their Seasons. By J. A. Owen. Geo. Routledge & Son, Ltd. 1904.

In this little book the author gives a pleasant account of the more familiar of our British birds. It is arranged into four parts, representing the seasons in which the descriptions of the birds appear. Such an artificial classification is somewhat unfortunate, as necessarily some species are included under one head, which might equally well occur under others. The volume is attractive in appearance, is printed with fairly large type, and is illustrated by a number of coloured plates; some, however, being rather gaudy. The book is cheap at half a crown.

NORTHERN NEWS.

We have pleasure in calling attention to the advertisement on the cover of this journal relating to an important work on Vegetable Histology by Mr. Abraham Flatters.

Mr. Arthur Bennett contributes to the 'Annals of Scottish Natural History,' October 1904 and January 1905, No. IV. of his 'Contributions toward a Flora of Caithness.'

Another Manchester society, the 'Manchester University Geologists' Association,' has been formed. Prof. Boyd Dawkins is the first president, and Mr. W. J. Hall secretary.

It is with deep regret we have to record the death on Monday, 20th February, of Mr. Alfred Beaumont, of Halstead, Essex, formerly of Huddersfield. We hope to give a detailed notice in our next issue.

Mr. G. E. Mitchell sends us a photograph of a portion of Alder trunk with a stone embedded in the centre. The tree, about 140 years old, was grown in Shropshire and felled in 1901. The specimen was shown at the recent exhibition in connection with the annual meeting of the Yorkshire Naturalists' Union at Leeds.

Part II. of 'The Jurassic Flora' (Catalogue of the Mesozoic Plants in Department of Geology, British Museum) by Mr. A. C. Seward, F.R.S., has recently been issued by the British Museum. In addition to the examples in the National Collection, reference is made to the more important specimens in other museums. Amongst the latter are several from the Coralline Oolite and Liassic Strata of East Yorkshire.

In a valuable paper on 'The Yoredale Rocks and their Commercial Deposits' in the recently-issued 'Transactions of the Weardale Naturalists' Field Club,' Mr. M. Lee gives the following curious 'quarrymen's geological section' of the strata exposed at Frosterby and Stanhope in Weardale. The quarrymen know each particular bed or 'post,' and can readily identify it, even from hand specimens:—

	ft.	in.		ft.	in.
Fine Posts	31	0	Dun Kit	4	0
Toby	1	8	Bastards	3	6
Crabby	8	0	Dun Gin	2	6
Scraps	2	0	Stiff Dick	1	6
Elsie	1	9	Weallies	3	4
Thin Cockle	0	10	Jack Post	0	4
Thick Cockle	1	4	Yard Post	2	9
Black Beds	3	10	Newcastle Post ...	1	0
Five Thinnings	2	0	Bottom Post	1	8

The Corporation of Bradford has recently acquired the collection of plants and botanical books formed by Mr. F. A. Lees, author of 'The Flora of West Yorkshire,' published some years ago by the Yorkshire Naturalists' Union. The herbarium contains over 20,000 specimens, and will be an admirable botanical nucleus for the natural history section of the Cartwright Memorial Museum.

ECONOMIC FUNGI.

PART III.*

J. H. HOLLAND, F.L.S.,

The Museum, Kew.

SYSTEMATIC ARRANGEMENT.

	<i>Agaricus arvensis</i> Schæff.
	<i>Agaricus campestris</i> L.
	<i>Agaricus exsertus</i> Vitt.
	<i>Agaricus silvaticus</i> Schæff.
	<i>Agaricus silvicola</i> Vitt.
	<i>Amanitopsis strangulatus</i> (Fr.) Roze.
	<i>Amanitopsis vaginatus</i> (Bull.) Roze.
	<i>Cantharellus cibarius</i> Fr.
	<i>Cantharellus cinnabarinus</i> Schw.
	<i>Cantharellus floccosus</i> Schw.
	<i>Cantharellus infundibuliformis</i>
	(Scop.) Fr.
	<i>Cantharellus lutescens</i> Fr.
	<i>Clitocybe clavipes</i> Pers.
	<i>Clitocybe gallinacea</i> Scop.
	<i>Clitocybe geotropa</i> Bull.
	<i>Clitocybe monadelphæ</i> Morg.
	<i>Clitocybe multiceps</i> Pk.
	<i>Clitocybe nebularis</i> Batsch.
	<i>Clitocybe odora</i> Sow.
	<i>Clitopilus orcella</i> (Bull.) Fr.
	<i>Collybia esculenta</i> Fr.
	<i>Collybia fusipes</i> (Bull.) Fr.
	<i>Collybia platyphylla</i> Fr.
	<i>Collybia radicata</i> (Relh.) Fr.
	<i>Collybia velutipes</i> (Curt.) Fr.
	<i>Cortinarius evernius</i> Fr.
	<i>Cortinarius corrugatus</i> Pk.
	<i>Hygrophorus borealis</i> Pk.
	<i>Hygrophorus ceraceus</i> (Wulf.) Fr.
	<i>Hygrophorus chlorophanus</i> Fr.
	<i>Hygrophorus chrysodon</i> Fr.
	<i>Hygrophorus coccineus</i> (Schæff.) Fr.
	<i>Hygrophorus conicus</i> Fr.
	<i>Hygrophorus eburneus</i> (Bull.) Fr.
	<i>Hygrophorus erubescens</i> Fr.
	<i>Hygrophorus flavo-discus</i> Frost.
	<i>Hygrophorus fuliginæus</i> Frost.
	<i>Hygrophorus hypothejus</i> Fr.
	<i>Hygrophorus laricinus</i> Pk.
	<i>Hygrophorus miniatus</i> Fr.
	<i>Hygrophorus nitidus</i> B. & C.
	<i>Hygrophorus niveus</i> Fr.
	<i>Hygrophorus penarius</i> Fr.
Agaricaceæ ...	<i>Hygrophorus pratensis</i> (Pers.) Fr.
	<i>Hygrophorus puniceus</i> Fr.
	<i>Hygrophorus spadiceus</i> (Scop.) Fr.

* Part I., 'The Naturalist,' February 1903; Part II., April 1904.

SYSTEMATIC ARRANGEMENT—continued.

Hymenomycetes

Hygrophorus speciosus Pk.
Hygrophorus virgineus Fr.
Hypholoma appendiculatum (Bull.) Fr.
Hypholoma capnoides Fr.
Hypholoma fasciculare Huds.
Hypholoma incertum Pk.
Hypholoma perplexum Pk.
Hypholoma velutinum Pers.
Lactarius chelidonium Pk.
Lactarius distans Pk.
Lactarius Gerardii Pk.
Lactarius insulsus Fr.
Lactarius piperatus (Scop.) Fr.
Lactarius subdulcis Fr.
Lactarius volemus Fr.
Lepiota acutesquamosa Wein.
Lepiota americana Pk.
Lepiota granulosa Batsch.
Lepiota lenticulare Lasch.
Lepiota naucina Fr.
Lepiota rachodes Vitt.
Paxillus involutus Fr.
Pholiota adiposa Fr.
Pholiota præcox (Pers.) Fr.
Pleurotus Pometi Fr.
Pleurotus tessellatus (Bull.) Fr.
Pleurotus ulmarius Fr.
Russula alutacea Fr.
Russula decolorans Fr.
Russula heterophylla Fr.
Russula lactea Fr.
Russula lepida Fr.
Russula ocreophylla Pk.
Russula roseipes Bres.
Russula vesca Fr.
Russula virescens Fr.
Tricholoma albellum Fr.
Tricholoma brevipes (Bull.) Fr.
Tricholoma portentosum Fr.
Tricholoma terreum (Schæff.) Sow.
Tricholoma Russula Trat.
Boletinus pictus Pk.
Boletus æstivalis (Paul.) Fr.
Boletus affinis Pk.
Boletus brevipes Pk.
Boletus bovinus Linn.
Boletus castaneus Bull.
Boletus chrysenteron Fr.
Boletus Clintonianus Pk.
Boletus collinitus Fr.
Boletus edulis (var. *clavipes*) Pk.
Boletus elegans Schum.
Boletus flavidus Fr.
Boletus flavus With.
Boletus fragrans Vitt.
Boletus granulatus L.
Boletus grisellus Pk.
Boletus luridus Schæff.

SYSTEMATIC ARRANGEMENT—continued.

Pyrenomycetes		Polyporaceæ ...	<i>Boletus luteus</i> Linn.
			<i>Boletus scaber</i> Fr.
			<i>Boletus spectabilis</i> Pk.
			<i>Boletus subaureus</i> Pk.
			<i>Boletus subglabripes</i> Pk.
			<i>Boletus subtomentosus</i> Linn.
			<i>Boletus versipellis</i> Fr.
			<i>Fistulina hepatica</i> Fr.
			<i>Polyporus Berkeleyi</i> Fr.
			<i>Polyporus confluens</i> Fr.
			<i>Polyporus cristatus</i> Fr.
			<i>Polyporus giganteus</i> Fr.
			<i>Polyporus intybaceus</i> Fr.
			<i>Polyporus leucomelus</i> Fr.
			<i>Polyporus ovinus</i> (Schæff.) Fr.
			<i>Polyporus poripes</i> Fr.
			<i>Polyporus squamosus</i> (Huds.) Fr.
			<i>Polyporus sulphureus</i> Fr.
			<i>Polyporus umbellatus</i> Fr.
Discomycetes ...		Hydnaceæ ...	<i>Trametes cinnabarina</i> Fr.
			<i>Hydnum albidum</i> Pk.
			<i>Hydnum Caput-ursi</i> Fr.
		Thelephoraceæ ...	<i>Craterellus Cantherellus</i> (Schw.) Fr.
			<i>Craterellus cornucopioides</i> (Linn.) Pers.
			<i>Clavaria amethystina</i> Bull.
			<i>Clavaria aurea</i> Schæff.
		Clavariaceæ ...	<i>Clavaria botrytes</i> Pers.
			<i>Clavaria cinerea</i> Bull.
			<i>Clavaria coralloides</i> Linn.
			<i>Clavaria fastigiata</i> Linn.
			<i>Clavaria pistillaris</i> Linn.
		Tremellaceæ ...	(var. <i>umbonata</i> Pk.).
			<i>Clavaria rugosa</i> Bull.
			<i>Tremella esculenta</i> Mass.
			<i>Tremellodon gelatinosum</i> Pers.
		Uredinaceæ ...	<i>Gymnosporangium Sabinae</i> (Dicks.) Wint.
		Dothidiaceæ ...	<i>Gymnosporangium macropus</i> Link.
			<i>Dothidella tinctoria</i> Sacc.
		Helvellaceæ ...	<i>Gyromitra esculenta</i> (Pers.) Fr.
			<i>Helvella californica</i> Phillips.
			<i>Helvella elastica</i> Bull.
			<i>Helvella Infula</i> Schæff.
			<i>Helvella lacunosa</i> Afzel.
			<i>Helvella sulcata</i> Afzel.
			<i>Morchella crassipes</i> Pers.
			<i>Morchella hybrida</i> Pers.
		Tuberaceæ ...	<i>Tuber mesentericum</i> Vitt.
			<i>Tuber magnatum</i> Pico.

It may be necessary to state here that many of the fleshy fungi described below as edible, are generally considered poisonous in this country — notably *Hypholoma fasciculare*, but which Mr. McIlvaine, an American author ('One Thousand American Fungi,' 1900) says is one of their most valuable species and not poisonous.

Boletus luridus and *B. satanus* the same author describes as being remarkably fine eating, after taking special pains to establish their edibility, his experiments extending over a period of fifteen years. The same he says 'may be said of *Boletus alveolatus*, *B. purpureus*, and *B. subvelutipes*.

Hygrophorus conicus is also considered edible in America, but not so in this country. Likewise, many other species are open to question, which, if thoroughly tested, would probably be proved beyond suspicion. There seems to be no constant rule to enable one to decide; much depends apparently on the locality or the medium in which the fungus grows, and doubtless a good deal on the constitution of the eater and the method of preparation. It would be advisable to eat nothing uncertain, without first making a cautious trial.

I am under obligation to the members of the Mycological Committee for many valuable suggestions towards the improvement of the list.

AMANITOPSIS VAGINATUS (Bull.) Roze. Europe, North America, and Australia. In woods and under trees. Edible.

AMANITOPSIS STRANGULATUS (Fr.) Roze. 'Strangulated Amanitopsis.' Britain and North America. In woods. Edible.

AGARICUS ARVENSIS Schæff. Horse Mushroom. Europe, North America, Ceylon, Tasmania, in pastures, edible.

AGARICUS CAMPESTRIS L. Common Mushroom. Europe, North America, Asia, Siberia, Africa, Australia.

AGARICUS EXSERTUS Vitt. Italy. In soil. Edible.

AGARICUS SILVATICUS Schæff. Europe, North America, Africa, Ceylon, and Australia. In woods. Edible.

AGARICUS SILVICOLA Vitt. Europe and Virginia. In woods. Edible.

BOLETINUS PICTUS Pk. North America. Edible.

BOLETUS ÆSTIVALIS (Paul) Fr. Germany and Britain. In woods. Edible.

BOLETUS BOVINUS Linn. Europe, Siberia, and North America. In Pine forests. Edible.

BOLETUS CASTANEUS Bull. Europe, North America, and Australia. In woods. Edible.

BOLETUS CHRYSENTERON Fr. Europe and North America. In woods. By some considered edible, by others injurious. In any case not worth risking.

BOLETUS SCABER. Fr. Europe, Siberia, and North America. In woods. Edible.

BOLETUS SUBTOMENTOSUS Linn. Europe, North America, Abyssinia, and Borneo. In woods. Value for eating said to be about equal to *B. chrysenteron*.

BOLETUS LURIDUS Schæff. Europe and North America. In woods. Said to be edible in America; always avoided in this country as poisonous.

BOLETUS LUTEUS Linn. Europe, Siberia, and North America. On ground in Pine forests. Edible.

BOLETUS COLLINITUS Fr. Europe and America. In Pine forests. Edible.

BOLETUS ELEGANS Schum. Europe and North America. In woods. Edible.

(To be continued.)

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NOTES AND COMMENTS.

COCKERHAM MOSS.*

Under the above title Mr. J. R. Charnley gives a short and interesting account of a well-known Lancashire gullery. He gives many useful particulars of the Black-headed Gulls now breeding in the district. The Cockerham Gulls it appears are



Nest of Black-headed Gull on Cockerham Moss.

probably part of the Walney Island stock, having first established themselves on a locality now occupied by part of Fleetwood. The pamphlet is illustrated by four process blocks of eggs and young birds—one of which we are able to reproduce.

YORK WALLS AND EARTHWORKS.

At York, in recent years, a resolution was submitted to the City Council to the effect that the moat adjoining the Lord Mayor's Walk be filled in with rubbish, but the proposal had met with so much criticism in the press that it was not agreed

* J. M. Wigley, Lancaster, price 6d.

to, and the moat remains as shown in the adjoining illustration, instead of being transformed into a playground for children. Evidently to more than one of the city fathers at York in this enlightened twentieth century

An earthwork on the rampart's rim,
A ditch of dirt it is to him,
And it is nothing more.

The story of York, with its walls, castles, earthworks, and old-time associations, is always an interesting one, but rarely has it been better told than in Mr. T. P. Cooper's new book.* In this the author has gathered together a mass of new material from many sources. Beginning with the 'Celtic Settlement and



The City Walls, with Remnant of Rampart and Ditch, Lord Mayor's Walk.

Roman Eburacum,' the author next describes the Anglo-Saxon and Danish defences, then through Norman and successive periods until quite recent times. The printing and general 'get-up' of the book is all that can be desired, and it is increased in interest by a number of illustrations, one of which we are permitted to reproduce.

FOOTPRINTS IN THE SANDS OF TIME.

The committee appointed by the British Association for the investigation of the fauna and flora of the Triassic rocks of

* 'York: the Story of its Walls, Bars, and Castles.' Elliot Stock, London. 10s. 6d. net.

the British Isles, has evidently done its work thoroughly, and, unquestionably, good will result. We have received a report from the Secretary of the Committee, Mr. J. Lomas, which is illustrated by diagrams and photographs of typical footprints, etc., for the benefit of investigators in this particular line of research. A valuable list of species from the Trias in the Jermyn Street Museum and the British Museum is also given by Mr. E. T. Newton and Dr. A. Smith Woodward respectively,



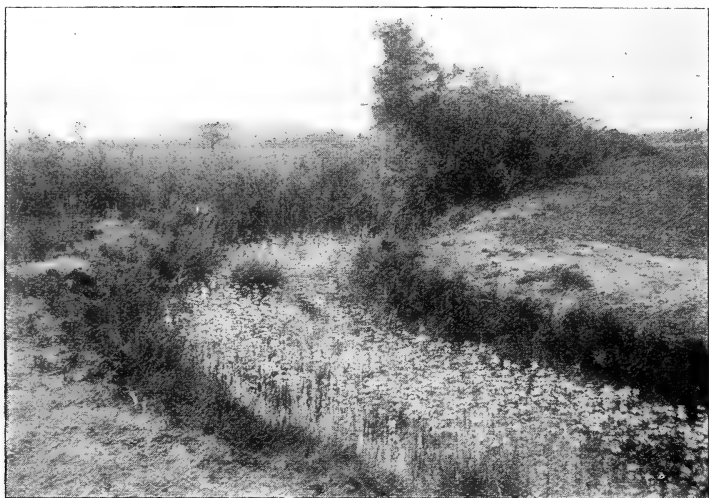
Rhynchosauroid Footprints on Sandstone from Runcorn.

forming a very useful appendix. We are indebted to the British Association for the loan of one of the illustrations, reproduced herewith.

SUTTON BROAD LABORATORY.

In the 'Transactions of the Norfolk and Norwich Naturalists' Society' is an illustrated account of the recently-established laboratory on Sutton Broad, which is under the direction of Mr. F. Balfour Browne. Formerly Sutton Broad was about 100 acres in extent, but now, in the summer time, it is a waste of reeds, reed mace, and bulrushes, with a great abundance of white Water Lilies, and every other kind of water weed; the roots of this vegetation form almost a complete stretch of

‘hover’ over the Broad. The accompanying illustration, kindly lent by the Sutton Broad Laboratory, shows a glorious patch of *Hottonia palustris*, and represents a scene as characteristic of



Water Violet at Sutton.

Holderness as of Sutton in Norfolk. It is to be hoped that the Laboratory will be made every use of—the charges are certainly most reasonable.

SIREX JUVENCUS F. AND *S. NOCTILIO* F. IN YORKSHIRE.

E. G. BAYFORD,

Barnsley.

IN ‘The Naturalist’ for 1894 at p. 288 I recorded as *juvencus* F. a female *Sirex* which had been taken alive in Wath Main Pit. Since then several other specimens have been brought to me at different times which appeared to be distinct both from it and *gigas* L. These had been placed on one side, and it was not until recently that my attention was re-directed to them. The cause for this was the receipt and consequent perusal of the instalment, dealing with the Siricidæ, of the Rev. F. D. Morice’s

Naturalist,

'Help Notes towards the determination of British Tenthredinidæ, etc.,' appearing at intervals in 'The Entomologists' Monthly Magazine.' The following remarks made me doubt the correctness of the record above-named:—

'Two species are pretty often found in this country, *gigas* L. and *noctilio* F. (= *melanocerus* Thoms.) Specimens of *noctilio* F. are, I believe, constantly recorded under the name *juvencus* F., and I have probably named them so for correspondents myself. But if the true *juvencus* occurs at all in Britain it must be very rare. I have it from Switzerland, but have never seen a British specimen which I can confidently refer to it (If any collector has a British specimen corresponding to true *juvencus* I should be exceedingly grateful for a sight of it).'

Acting on this invitation, I sent for determination the various species I thought I had, and included with them a specimen in every way, but size, identical with my recorded *juvencus*, recently taken at York. Dr. Corbett also sent the specimen recorded by him as *juvencus* in 'The Naturalist' for November.

This last proves to be a female of the true *juvencus* F. Mr. Morice says, 'It is the first I have seen with a definite British locality of origin.' The rest were males and females of *gigas* L. and *noctilio* F. The three species are thus proved to occur in Yorkshire. In this connection it may be as well to acknowledge the prescience of Mr. W. D. Roebuck, whose suspicions as to the correctness of determination of the Yorkshire specimens recorded as *juvencus* F. deserve quotation. Writing of the 'Yorkshire Hymenoptera in 1878,' he said, 'These specimens [from a colliery near Barnsley] (and also one which was taken alive in Leeds in 1877), although usually referred to *S. juvencus*, seem to agree tolerably well with Thomson's description of his *melanocerus*. But in view of the great variability of the insects of this genus, it remains for further investigation to show whether they really appertain to the new species [i.e., *melanocerus* Thoms.] or are merely aberrant specimens of the old one; or even to show whether *S. melanocerus* itself be truly distinct from its congener' (Trans. Y.N.U. for 1880).

Like all internal feeders, specimens of *Sirex* vary very much in size, some being fully twice as large as others. They are also liable to become greasy in time, but an occasional bath in benzine or petrol will remedy this at least in part.

In Memoriam.

ALFRED BEAUMONT.

It is with sincere regret that we record the death of Mr. Alfred Beaumont, which took place suddenly in the evening of Monday, 21st February, in the seventy-fourth year of his age. He was one of the oldest field naturalists in the country, and was also almost the oldest Fellow of the Entomological Society of London, having been elected in 1851. Born at Honley, near Huddersfield, his early school days were spent at Storthes Hall, near Huddersfield, under the tutorship of the late Mr. Peter Inchbald, who, in his day, was well known throughout the country as a good entomologist. As school-fellows, Beaumont there met the late J. W. Dunning, and the late T. H. Allis, both of whom, along with himself, soon imbibed their master's passion for entomology, a passion which all three retained to the end of their lives. It was at Storthes Hall, too, we believe, that he first met the late H. T. Stainton, and the long years of intimate friendship between Inchbald, Stainton, Dunning, and Beaumont was only broken by death. On leaving school Beaumont joined his father's large woollen manufacturing business at Steps Mill, Honley, subsequently becoming the head of it himself. He early became associated with the Huddersfield Naturalists' Society, then chiefly composed of working men, and, as was natural in a man of his position, taking a very active and enthusiastic interest in it, he soon made it a large, successful, and prosperous society. For a considerable time, now towards forty years ago, he was its President, and the life and vigour he put into it are well remembered yet by those of its then members who have never broken their connection with the society. It is recalled with pride how in those days he took the lead in the inauguration of large and successful natural history exhibitions of fortnight's duration, when one of the largest halls in the town was always filled with specimens, which were always opened by the Earl of Dartmouth, supported on the platform by some of the country's most eminent naturalists, friends of the President. At one of these exhibitions Beaumont created quite a sensation in the town by inviting and entertaining the eminent explorer just returned to England, Du Chaillu, who gave a lecture in the exhibition on his recent discovery of the Gorilla, an ape which he declared to closely resemble the human being, and which consequently was creating great public interest. Another ever to be remembered day was that on

which he entertained on his invitation to a sort of picnic meeting, the members of the Naturalists' Society and their friends in the beautiful grounds of his house at Wilshaw, when his large collections were thrown open for inspection. At that time Beaumont was as keen an ornithologist as he was a lepidopterist, and his fine collection of well-mounted British birds was known far and wide. It contained many local rarities, including a pair of Waxwings shot at Fenay Bridge, a Bittern killed at Honley, and many others. On the other hand, several specimens which Beaumont had bought as 'undoubtedly British,' and apparently on good authority, were afterwards known to have been fraudulently imposed upon him. These included an Andalusian Quail, a White's Thrush, and a Ross' Gull. Unfortunately, too, the records of one or two of these as British examples had been widely circulated.

His collection of lepidoptera was then by far the finest in the district, and contained many great rarities. Perhaps the species in which the greatest interest then and since centred were some specimens of *Notodonta bicolor*, taken and bred by Mr. John Ray Hardy from Burnt Wood, Staffordshire, about 1865, since which captures the species has not, I believe, been taken in Britain. One of the specimens given to him by Beaumont, in 1896, now represents the species in the writer's cabinet. Nothing could exceed the generosity of Beaumont in the matter of his duplicates. It was his delight to spread open his boxes before his friends and absolutely to make them take out everything they wanted; whilst his scorn for the present day system of bargaining with duplicates was unbounded. Nor can the writer forget the happy days long since, when Beaumont used to repeatedly drive him, then little more than a schoolboy, for afternoons' collecting in the Storthes Hall woods, nor the enjoyable meals at the inn near by, when the afternoon's work was over.

On the removal of Beaumont to London his ornithological and entomological collections were disposed of, with the exception of a few of the rarities from each which he retained. The birds now form the chief portion of the beautiful collection in the museum of the Technical College, Huddersfield. After a prolonged visit to Mr. and Mrs. Stainton at Mountsfield, Mr. and Mrs. Beaumont settled down near their friends' residence at Lewisham, in 1884, when Beaumont's collecting propensities at once impelled him to active field work again; but his energies were now devoted to several of what have been termed the 'neglected orders' of insects, rather than to the lepidoptera,

and he did splendid work among the coleoptera, hymenoptera, neuroptera, and diptera, repeatedly adding species new to the British list, and in some cases new to science in some of these orders. Perhaps his favourite locality of late years was the lovely district of Oxshott, in Surrey, and where the writer has spent some enjoyable hours collecting in his company. It was there that he added to the British list the very interesting lace-wing fly *Chrysopa dorsalis*, and we believe the locality produced to him several hymenoptera new to science. He seemed never tired of collecting, and setting his captures, and up to the time of his death, at so advanced an age, his setting of the most minute species was a marvel of neatness. But the naming of his captures was always irksome to him, and rather than trouble over it, he usually sent his doubtful specimens to specialists, often to their advantage, as they were frequently allowed to retain the specimens of even new species if there happened to be more than one representative.

In 1885, whilst stripping off the bark of trees at Lewisham, searching for beetles, Beaumont happened to come across specimens of the rare micro-lepidopteron, *Ochsenheimeria vaculella*, and afterwards found that the species could be taken in great plenty in the district under the bark of trees. He used to tell with great glee the story of how he introduced Mr. H. T. Stainton to the species. Calling on Mr. Stainton at Mountsfield to tell him of his find, Beaumont told him he could almost guarantee to find it for him in his own (Stainton's) grounds. Mr. Stainton was incredulous, but, on Beaumont's invitation, armed with a lot of chip boxes, he walked into the garden with him. Beaumont very soon showed him the insect in plenty, and before they had got round the grounds Mr. Stainton had not only filled his boxes with a moth in his own special group, which he had never even suspected to occur there, but had been obliged to transgress one of his favourite sayings, which was to 'never put more than one moth in a chip box,' for numbers of his boxes contained two apiece! Another story, which illustrates his kindness of disposition, may be told here. Beaumont was always a keen sportsman, and in his young days, when poachers were suspected in his preserves, he was not averse to accompanying the keepers at night to join in the watching, and, if necessary, to be in at the fray. On one occasion, in Butter Nab Wood, he took the gun from a man who was poaching, and then told him he must pay twelve shillings, or he should send him a 'summons!' The man brought him

a shilling each week for twelve weeks, at the end of which time Beaumont handed him back his gun, along with the twelve shillings, and told him to avoid poaching for the future.

On relinquishing commercial life about two years ago, Beaumont removed from London to the pretty village of Gosfield, in Essex, where he and his estimable wife made a charming home, and where they had hoped to have spent a few more years together in the quiet pursuits of country life, but which, alas ! was not long to be realised.

A well-built and strong, active man all his life, he had been ailing during the past few weeks from an apparently slight heart trouble, when on the date already mentioned, whilst actually sitting at the table, working at his insects, he suddenly passed away. Truly he died in harness.

He was twice married, but lost his first wife many years ago, when the beautiful church at Wilshaw, near Huddersfield, was erected to her memory. His second wife survives him, and we are sure that the sincerest sympathy of all his naturalist and other friends will go out to her, in the heaviest of all blows which could have come upon her.

G. T. P.

THE MAKING OF EAST YORKSHIRE.

THOMAS SHEPPARD, F.G.S.

ONE frequently hears reference to the 'everlasting hills,' and to the uninitiated there seems to be a general impression that the world is now as it always has been ; the present mountains and valleys, and rivers and sea, being as they were left after the deluge.

A cursory glance, however, will show that the history of the earth, like the history of any country or community, is an interesting one ; there have been many ups and downs and changes of very important character. As in the case of our written histories there are many blanks in the great chain of evidences relating to the gradual evolution of the earth from its once molten mass to its present more rigid form. In England we are exceptionally favoured by having representatives of all the important strata comprising the earth's crust, and in our islands we have an epitome of the geological history of the earth. In Yorkshire, strangely enough, we possess examples of most of the important rocks in the country, which fact makes

a consideration of the geological history of this county an utterly impossible task for a single paper. In the following notes, therefore, it is proposed to review the changes which have taken place in East Yorkshire only, which, fortunately for the purpose of these notes, includes representatives of the more recent rocks only, although even amongst these recent strata there are important gaps.

Of the four great divisions of the earth's crust which geologists have made for convenience of classification, there is represented in East Yorkshire only the beds of the Secondary or Mesozoic rocks, and the Quarternary or Recent rocks; of the great Tertiary system, so admirably developed in the south-east of England and in France, we have practically no trace whatever. There is no doubt that at some time East Yorkshire was covered by some portions of the Tertiary deposits, but they have been entirely swept away.

Confining ourselves to the beds of sandstone, limestone, and shale, formed during the secondary epoch, and to the sand, gravel, and clay deposited in comparatively recent times, we find that if read aright they reveal many interesting facts in the history of this section of our county. We have no 'everlasting hills' here. In East Yorkshire at any rate it may be truly said—

The hills are shadows, and they flow
From form to form, and nothing stands;
They melt like mists, the solid lands,
Like clouds they shape themselves and go.

The deposits within easy access of Hull give absolute evidence of many changes having taken place. We can see them to-day on a small scale. Our cliffs for 30 miles are being eroded at 7 ft. per annum. The historian tells us of villages and towns once situated on the coast and in the Humber, which have gone. The river Humber itself, as navigators know to their cost, is by no means constant in its course. Large areas are silted up—Sunk Island, Reed's Island, and Broomfleet Island, and land elsewhere is being reclaimed, which makes up for the deficiency of that lost on the coast. Our rivers are constantly carrying detritus into the Humber and the sea. The rain, frost, and wind are slowly but surely affecting our wolds, dales, and cliffs. Occasionally a water-spout or other unusual phenomenon reminds us of the great power of the 'elements' when they have full play. A large gully in the side of the dale at Langtoft, near Driffield, is evidence of one of

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these. Such changes, small and insignificant though they may appear to be, unquestionably tell in time. A farmer on our coast, or a ship's captain familiar with the Humber, could tell more graphically of the changes they are familiar with, yet these changes have taken place within a comparatively short period. Compared with geological time our centuries are but seconds. The formation and erosion and re-formation time after time of the various rocks, as well as for the gradual evolution of animal and plant life, whose remains are therein entombed, require a period of time which, if numbered in years or even centuries, would be far too great to be comprehended. In the geological history of East Yorkshire, therefore, we must remember that we are starting at a point very late in the history of the globe. The remains of animals and plants preserved in the Liassic strata, which are the oldest I propose to touch upon, indicate a very forward state of advancement. The relative position of the Liassic rocks upon the older rocks shows that they were formed in a comparatively recent period, and great as are the changes which have taken place between then and now, these are small and insignificant as compared with the upheavals and depressions which had taken place prior to the formation of the Liassic beds.

Another advantage in studying the rocks of East Yorkshire is the fact that they are exposed in the cliffs in wonderfully regular order. The beds are deposited one upon another just as one might pile some volumes of books; and there is a gradual dip or slope of the rocks to the south-east, which enables one to walk along the cliffs from south to north and to examine each bed in its proper order as it presents its surface in the cliff line. So admirable is this arrangement in Yorkshire that it might almost be said that the sections have been arranged for the convenience of the geologist!

The Lias, as the name implies, refers to those rocks, which occur in thin layers, exposed in the cliffs between Whitby and Robin Hood's Bay, and inland at certain points. Near Hull they can be examined at North Cave and Cliff, at which places are lower beds in the series than represented in the cliff sections. The layers in the rocks are particularly well shown in natural sections from the fact that they consist alternately of limestone and shale. The latter material, being much softer than the former, is easily eroded, resulting in prominent layers of limestone, perfectly parallel to each other, being divided by the soft shale beds. These are the deposits which were formerly worked

to such a large extent for alum and jet. The alum works at Boulby necessitated excavations of enormous dimensions, during which many strange animals with long necks and jaws (and almost as long names!) were discovered. If a bed of shale be examined carefully it will be found to consist of minute particles of mud or sediment which at one time were deposited in a comparatively shallow sea. It is suggested that the edges of that sea consisted of cliffs containing coal measures, the denudation of which gave the Liassic shales their dark colour. The bands of Liassic limestone are renowned commercially for their purity, and to the student of nature they have many points of interest. They contain more completely than do the adjoining shale beds the remains of the inhabitants of the Liassic sea, and indicate the probable conditions which existed during the time they were in process of formation. Here a layer will be found to consist entirely of Oyster shells—a fossil oyster bed, in fact. There, the remains of strange Mollusca, Ammonites and Belemnites, abound in thousands. Another bed will be largely composed of the stems of Encrinites or Sea Lilies; still another is made up of the fragments of all of these, whilst here and there a complete skeleton or the dismembered remains of an enormous Fish-lizard lie buried. Reasoning from the present to the past, and bearing in mind the nature of the deposits in modern seas and oceans, and the organic remains therein found, it is not difficult to assume what was the condition of things prevailing whilst the rocks around Whitby were being formed. The Oysters in the oyster-bed are not precisely the same as those living at Cleethorpes to-day, but they are sufficiently near in general resemblance to impress even a novice with the fact that they probably thrived in somewhat similar surroundings. The time is now gone when the organic remains in our quarries and cliffs were considered to be, as Wordsworth puts it,

‘The sport of Nature, aided by blind chance,
Rudely to mock the works of toiling man.’

The Ammonites so characteristic of the Whitby cliffs are no longer looked upon as ‘Snakes which were turned into a coil of stone, when holy Hilda prayed.’ Naturalists have convinced us that the Ammonite, like the living Nautilus, was once a denizen of the seas, and crawled on the sea floor or floated on the top at will, by means of its ‘siphuncle’ and chambers. We have left to us the Nautilus in our seas to-day, and it may be noted that the same genus was living, in company with the Ammonite, in the old Liassic waters. The Ammonite appears

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to have become extinct, in these parts at any rate, at the close of the Chalk era, whilst the Nautilus still lives on.

G. F. Richardson has put very nicely the story of these shells :—

The Nautilus and the Ammonite
Were launched in friendly strife,
Each sent to float in its tiny boat,
On the wide, wild sea of life.

. . .

And hand in hand, from strand to strand,
They sailed in mirth and glee ;
These fairy shells, with their crystal cells,
Twin sisters of the sea.

. . .

The Nautilus now, in its shelly prow,
As over the deep it strays,
Still seems to seek, in bay and creek,
Its companion of other days.

With regard to the Ichthyosaurus and Plesiosaurus, huge animals sometimes reaching 30 or 40 feet in length, these remind us of the (fortunately) changed conditions which now prevail. In the old seas these creatures, some with short necks but powerful long jaws armed with rows of teeth, others with long, swan-like necks and small heads, must have had a very awful effect upon their contemporaries. The gigantic flying-Lizard or Pterodactyl haunted the same waters. The creeks and lagoons and shallows were swarming with millions of strange Squids and Cuttlefish, the hard backbones of which (the only durable parts) are left to us in the form usually known as 'thunderbolts' (belemnites). Altogether the picture of the Liassic sea is not a pleasant one from the point of view of sailing or bathing, but at that time man had not made his appearance upon the earth, and the animals would, no doubt, roam about at pleasure without running the risk of being shot at by bipeds with guns, called 'sportsmen.'

Century after century, as time went on, the deposits at the bottom of this sea accumulated until eventually they formed a series of beds measuring several hundreds of feet in thickness. If we carefully examine the slow rate at which mud deposits are formed in our modern seas, and the still slower rate at which beds of limestone accumulate, and then endeavour to form some idea of the enormous period that it must have taken for the formation of the hundreds of feet of the Liassic rocks, and then remember that these Liassic rocks are a very small

section of the earth's crust, and that the earth's crust itself, some 20 miles in thickness, is but a moiety of the world proper, we can form some vague idea of the length of geological time.

From some cause or other the Liassic sea became elevated, the water and its inhabitants found a resting place elsewhere. What was once an ocean floor became for the time being dry land, which eventually again finds its level beneath the sea, and upon the Liassic rocks is a great series of limestone and shales of newer date belonging to the Oolitic system.

These Oolitic beds have been classified as under:—‘Dogger, Lower Estuarine Series with ‘Eller Beck Bed,’ Millepore Bed, Middle Estuarine Series, Scarborough or Grey Limestone, Upper Estuarine Series, Cornbrash, Kellaways Rock, Oxford Clay, Lower Calcareous Grit, Greystone or Passage Beds, Lower Limestone and Coral Rag, Middle Calcareous Grit, Upper Limestone and Coral Rag, Upper Calcareous Grit,’ and these divisions are further divided according to their characteristics. To examine each of these in detail is an undertaking which cannot now be embarked upon; it is perhaps sufficient to state that they comprise a series of rocks altogether measuring some thousands of feet in thickness, of great variety, and indicate a great number of changes on the earth's crust during their formation. Take, for example, some of the rocks: the Millepore Bed (so called from a minute coral occurring therein which is perforated with small holes or pores) is a characteristic roestone or Oolitic rock. If a specimen, such as might be obtained at Hotham, or Brough, or on the cliffs near Scarborough, be carefully examined, it will be found to consist of minute globules of lime, cemented together very much after the manner of the roe of a fish. It is from this character, which is also found in other beds of the Oolitic system, that this particular series derives its name, from the Greek word *οον*—an egg; and it is perhaps only natural that early philosophers assumed that these entire rocks, extending for miles, and of great thickness, really represented fossil fish-roe! Modern science has changed all that. Examined under a microscope each globule is found to consist of a number of concentric layers of lime, surrounding a small nucleus—usually a very small sand grain, a shell of a foraminiferon, or some other similar object. These small particles, moving to and fro in water super-saturated with lime, have become coated layer after layer with the substance in a similar manner to the familiar instance of

a marble, which, placed in a kettle of water, gradually grows, as succeeding layers of lime are deposited upon it.

In the limy matrix of the particular rock now being noticed are innumerable fragments of the small Coral (*Cricopora straminea*), remains of Ammonites, and various bivalves and univalves, and other shells characteristic of the Oolitic series, also occur in fair profusion.

A little above this bed are some sandstone rocks, which contain hardly any lime whatever, and were evidently deposited under altogether different conditions. In them are layers of vegetable matter, which, in the famous cliffs at Gristhorpe, have yielded such a wealth of plant remains. These, after the manner of the coal measures found in the older rocks, indicate a totally different state of things from any we have yet considered. On examining the plant-remains closely they are found to consist of huge Ferns and Cycads such as now occur in far-off countries. They are of a type not so highly developed as that constituting the flora of the country we live in to-day. None of the higher flowering plants grew during the time the Gristhorpe bed was being formed. On the other hand, however, that plant bed has entombed in it the remains of vegetation of a higher form than that found in the coal measures. This is as one would naturally expect, and is an illustration that the older rocks contain more primitive forms of animal and plant life; whilst, as we ascend in the series composing the earth's crust, we find more highly developed organisms inhabited the globe. Sir Archibald Geikie has truly said: 'It is undoubtedly a great triumph of Geological science to have demonstrated that the present animals and plants of the globe were not the first inhabitants of the globe, but that they have appeared as descendants of a vast ancestry. The latest comes in a majestic procession, we ourselves stand heirs of all the ages of the past, and moving forward into the future, wherein progress towards something higher must still be for us, as it has been for all creation, the guiding law.'

The Gristhorpe beds were evidently formed near the mouth of a huge estuary, but where precisely the river or rivers that formed it existed, and where the area of the sea in which it flowed, we cannot say. It would be interesting to picture the nature of the luxuriant vegetation flourishing at Gristhorpe in this far-off time. Gigantic 'Horse-tails,' towering much above the height of man and as thick as one's arm, grew in profusion, but the most remarkable plant was the Maiden Hair Tree (*Ginkgo bioloba*), which now has a natural home in Japan.

Leaving the estuarine series, we pass over one or two deposits, and then reach the Kellaways rock. This is evidently a shallow-water formation. At South Cave an excellent section is exposed in the railway cutting, which is one of the best collecting grounds near Hull. It simply abounds in various species of Ammonites and Belemnites, and shells of all descriptions. At its base is a distinct oyster-bed, 7 or 8 inches in thickness, crowded with thousands of Oysters, which weather out from the face of the cutting from their greater hardness than the surrounding sandstone.

In Gristhorpe Bay this same rock forms a natural sea wall at the base of one of the finest pieces of cliff on the whole of the Yorkshire coast. Upon it are the soft light-blue shales of the Oxford Clay, which even yet can be cut quite easily with a penknife. These form the centre of the cliffs—the upper part consisting of a light-coloured rock—the Calcareous Grit. From the hardness of this last-named material, as compared with the Oxford Clay, it stands well out and with a straight, steep face. Viewing this cliff either from the beach or from the top, one gets an admirable example of the effect of weathering upon various rocks, which has so much influence upon the scenery of the district. The russet-red Kellaways Rock forms a prominent scar at the base of the cliffs, which is sufficiently hard to withstand the waves fairly well, and wears an abrupt perpendicular front. The Oxford Clay above this is usually weathered by wind, frost, and rain, and recedes into the cliff at a much quicker rate. Upon this is a grit of more substantial material which overhangs the clay beneath. The difference in colour in these rocks also adds to the charm of the scene.

This same Calcareous Grit, which forms such a prominent feature at Gristhorpe, is that which has resulted in the formation of the magnificent flat-topped Tabular Hills to the west of Scarborough. Originally the entire district was covered by this hard grit; the action of rain, wind, frost, and other natural agencies gradually resulted in channels being cut through the grit cap into the Oxford Clay below. This soft rock, once penetrated, was quickly washed away. The overhanging grits fell down and, slowly but surely, the channels were widened, until eventually those beautiful dales so familiar in the Scarborough district were formed, the sides of which are composed of the sloping shales of the Oxford Clay, surmounted by a perpendicular summit of Calcareous Grit.

Still ascending these rocks in their natural order, we have numerous other beds, principally of limestone, but particular reference must only be made to one of these, namely, the Coral Rag. This bed is nowhere better developed than in the Scarborough district. Briefly, it consists of an enormous fossil coral reef, resembling in almost every detail the coral reefs formed in the Pacific and Indian Oceans to-day. On entering a quarry (of which there are several for the purpose of lime-burning and road-mending) one cannot but be impressed with the nature of the material being excavated. On all sides are great round masses of beautiful corals, some of them measuring many feet in diameter. These occur, mushroom-like, all over the quarry floor and on the sides. A near examination is not necessary to see the beautiful designs worked by the coral animal eons ago. A pocket lens reveals still further beauties in every piece of limestone picked up. Between the large fragments of coral, some of which are so fresh that they might have recently been brought up by divers from the modern ocean, one finds the remains of shells, sponges, teeth, and spines of fishes, and other organisms which have found their way into the crevices, and become entombed and eventually solidified. Further, the masses of coral themselves are frequently penetrated in all directions by rock-boring shells, in this respect still further resembling modern coral reefs. In fact, I know of no feature in the coral reef of to-day, down to the minutest detail, but can be matched in the coral reef composing the Rag around Scarborough, which is now a great height above the sea, and some miles inland. No wonder that this district has been the birthplace of so many prominent leaders of geological science. William Smith, the father of English geology, received many of his most important lessons in this very district, and resided there to his (and our) great profit for many years. John Philips, the pioneer of Yorkshire geology, Bean, Huddleston, and a host of others might be mentioned, all of whom owe their fame to the interest attached to the rocks around Scarborough.

These selfsame rocks also occur in the Malton district, and in former years the late Samuel Chadwick did much good work in collecting and preserving in the Malton Museum specimens from these beds.

Whilst this great mass of rock was in process of formation in some parts of East Yorkshire, in the Market Weighton district, as shown by Professor Kendall, there seems to have

been some disturbing element in the earth's crust which has interfered all along with the regular deposition of the strata. At Market Weighton there is evidence of a gradual lifting of the earth's crust during this long secondary period, resulting in only thin representatives of the rocks being formed. But the Market Weighton unconformity is a subject sufficient for a paper in itself, and beyond reference to it must not be entered into now. Suffice it to say that even in East Yorkshire, simple as the geology is, it has many features which indicate that everything has not in past times run along so smoothly as one might at first have assumed.

Leaving the Oolitic rocks, with their corals and shore deposits, and shallow water formations, we are suddenly confronted with evidences of a change of a somewhat drastic character. The country, in common with the greater part of Europe, seems to have suffered a depression; it was under water to a great depth, and slowly but surely was covered over, as with snow, by a white, soft sediment, now known as chalk.

In the North of Ireland, in Scotland, and on the Continent, as in the South and East of England, traces of this chalk sea still remain. In some cases hundreds of feet of it have been preserved for our study, but over large areas every trace of the chalk seems to have been swept from the face of the land. Mr. Lamplugh, of Bridlington, has estimated the thickness of the Yorkshire chalk to be 1,270 feet, every particle of which has accumulated slowly on the floor of a vast ocean, and represents the dead shells or skeletons of foraminifera once living in that cretaceous sea. As is the rule in geology, an idea of the nature of the chalk sea is obtained from examining in detail the deposits now being formed in somewhat similar situations. The Challenger and other expeditions have revealed the nature of our modern ocean floors. There, accumulating, is a soft white substance, amongst which are teeth and bones of fishes, the shells of mollusca, and other organic remains. On examining the white substance under a powerful glass, it is found to consist almost entirely of foraminifera, principally of the kind known as *Globigerina*.

On taking a piece of chalk from Hessle or Flamborough and, after preparation, placing it under a microscope, it is found to consist of precisely similar organic remains; in fact, it would be difficult for a novice to detect which were chalk and which modern *Globigerina* ooze. Look into a chalk quarry, or at the face of the Flamborough cliffs: in addition to the chalk proper,

one finds in it teeth of sharks, occasional scales of fishes, tests of Sea Urchins, large oyster-like bivalves, remains of Ammonites, Cuttlefishes, Sponges, and other denizens of the deep. Here, again, as in the case of the coral reef at Scarborough, we can match exactly the modern deposit with an ancient one. Bearing in mind the exceedingly slow rate at which the Globigerina ooze is being formed, estimated by some authorities at one-quarter of an inch in a century; then, standing upon the beach at Speeton, look up at the cliffs towering above to a height of 440 feet, and think of the probable impression man will have made upon this earth's surface in geological years still to come, and the 'sermons in stones' thus given will convince any individual, no matter how important he may consider himself, of the really insignificant part he plays in the history of the universe.

Reverting for the moment to this enormous cretaceous ocean, we find that this area was subjected to another change, and the ocean floor was elevated to a great height above the level of the water. The hundreds of feet of solidified Globigerina ooze were thus raised, and formed an enormous continental plateau.

In some areas, where elevation had gone on at a more rapid rate than in others, cracks and fissures would be formed, and the gradually rising land at last protruded right through the chalk; subærial denudation eventually caused all traces of the chalk to be entirely swept away, carried by means of rivers to another sea, where the detritus commingled with the newer ocean floor, and again contributed to the building up of still further organisms, which in time formed newer deposits; and so the cycle runs on, the wearing away of one rock resulting in the formation of another. In this way

'The earth hath gathered to her breast again,
And yet again, the millions that were born
Of her unnumbered, unremembered tribes.'

During the period this country was covered by chalk we possibly had the origin of some of our present river channels. The geological history of the river systems of this country is one of exceeding interest and value, and in many cases there is evidence that the channels occupied by, at any rate the principal of our rivers, are of great antiquity.

(To be continued.)

Dr. R. T. Cassal has secured some specimens of the rare Trichopteron, *Limnophilus elegans*, in the Isle of Man. This is apparently a new record for the island.

Mr. W. J. Clarke informs us that the Pacific Eider Duck recorded as shot at Scarborough in 'Knowledge,' and in this magazine for February, really came from the Orkneys to him, and was not shot on our shores.

FLOWERING PLANTS OF LITTONDALE AND LANGSTROTHDALE.

REV. TREVOR BASIL WOODD, M.A., LL.B.,

Oughtershaw Hall.

THE comparative lists of flowering plants of these two dales may be of interest as showing the difference in character in the two areas.*

PLANTS OF LITTONDALE

(NOT RECORDED FOR LANGSTROTHDALE).

Ranunculus Lenormandi.	Crepis hieracioides.
Ranunculus auricomus.	Hieracium anglicum.
Neckera claviculata.	Hypochaeris radicata.
Cardamine amara.	Leontodon autumnalis.
Silene cucubalus.	Tragopodon pratense.
Cerastium glomeratum.	Pyrola minor.
Arenaria trinervia.	Legustrum vulgare.
Sagina nodosa.	Erythræa Centaurium.
Hypericum hirsutum.	Polemonium cæruleum.
Geranium phæum.	Verbascum Thapsus.
Rhamnus catharticus.	Linaria Cymbalaria.
Trifolium pratense.	Veronica Anagallis aquatica.
Trifolium dubium.	Mentha arvensis.
Hippocrepis comosa.	Calamintha officinalis.
P. spinosa ?	Stachys palustris.
P. Avium.	Lamium purpureum.
Rubus cæsius.	Polygonum Persicaria.
Dryas octopetala.	Rumex scutatus.
Achemilla arvensis.	Daphne Mezereum.
Rosa tormentosa.	Euphorbia Lathyris.
Pyrus rupicola.	Juniperus communis.
Saxifraga oppositifolia.	Taxus baccata.
Saxifraga stellaris.	Habenaria virides.
Ribes grossularia.	Narcissus Pseudo-narcissus.
Apium nodiflorum.	Galanthus nivalis.
Chærophyllum tunulium.	Polygonatum officinale.
Viburnum Opulus.	Convallaria majalis.
Sherardia arvensis.	Allium Scorodoprasum.
Scabiosa arvensis.	Colchicum autumnale.
Eupatorium cannabinum.	Polystichum angulare.
Tanacetum vulgare.	Lastræa rigida.
Carlina vulgaris.	Equisetum sylvaticum.
Mariana lactea.	Gnaphalium uliginosum.
Serratula tinctorio.	

* For previous lists see 'The Naturalist,' 1889, pp. 271-277; 1892, pp. 13-15.

PLANTS OF LANGSTROTHDALE

(NOT RECORDED FOR LITTONDALE).

Sisymbrium Alliaria.	Rumex sanguineus.
Hutchinsia petræa.	Rumex domesticus.
Trifolium dubium.	Salix nigricans.
Potentilla palustris.	Empetrum nigrum.
Hippuris vulgaris.	Juncus squarrosus.
? Althusa Cyapium.	Luzula Forsteri.
? Caulalis Anthriscus.	Luzula maxima.
Lonicera periclymenum.	Potamogeton polyganifolius.
Galium palustre.	Scirpus setaceus.
Gnaphalium sylvaticum.	Carex pallescens.
Hieracium cætium.	Carex fulva.
Hieracium vulgatum.	Poa nemoralis.
Hieracium tridentatum.	Lastræa Oreopteris.
Hieracium boreale.	Phegopteris Dryopteris.
Pyrola rotundifolia.	Phegopteris polypodioides.
Trientalis europæa.	Equisetum maximum.
Stachys Betonica.	Equisetum arvense.
Polygonum aviculare.	

The following records for Langstrothdale are additional to those previously published :—

Aquilegia vulgaris.	Primula veris x vulgaris.
Near Beckermonds.	Greenfield ; Oughtershaw Ghyll.
Montia fontana.	Myosotis arvensis. Oughtershaw.
Oughtershaw Moss, 1904.	Melampyrum sylvaticum.
Saxifraga granulata.	Oughtershaw, 300 feet above
Greenfield Road.	W. Y. F.
Hedera Helix.	Plantago media. Oughtershaw.
Near Beckermonds.	Salix repens. Oughtershaw.
Adoxa Moschatellina.	Arum maculatum. Oughtershaw.
Oughtershaw, 1,250 feet ;	Eriophorum vaginatum.
Oughtershaw Tarn, 1,800 feet.	Tarn side.
Sonchus asper. Deepdale.	Holcus lanatus. Oughtershaw.
Schollera oxycoccus.	Chara vulgaris.
Swarthghyll.	Beckermonds Tarn.

THE EVOLUTION OF MUSEUMS.

THE museum as now known is by no means the institution originally understood by that name, and the various phases it has passed through, from the earliest times to the present day, is an interesting record of the advance in knowledge and of the greater educational value of more modern collections of objects of Art and Natural History, as compared with those of previous times.

The first museum, or, at any rate, the most important museum of antiquity, was the institution at Alexandria, established by Ptolemy Philadelphus in the third century before Christ. This museum was founded for the promotion of learning and the support of students. It formed part of the palace and contained cloisters, a public lecture-room, and a common hall, with botanical and zoological gardens attached. It was supported by a grant from the treasury, and was under the superintendence of a priest nominated by the king, and after Egypt became a Roman province, by the emperor. In the language of modern times it would be called an academy, or perhaps a college or university. After Alexandria passed under Roman rule its prosperity began to decline; its public buildings were allowed to fall into disrepair, its works of art were removed to Italy: and by the end of the fourth century of our era it had well nigh been ruined and the museum closed.

Dr. David Murray, F.S.A., has recently issued a valuable work on 'Museums; their History and their Use,'* in which he has gathered together an enormous amount of material bearing on the question. He has given a description of the 'Earliest known Museums and Collections,' an interesting account of 'The Beginning of the British Museum,' and notes on 'Special Collections,' 'Scottish Museums,' 'Museums as Shows,' 'Dispersion of Museums,' 'Non-Scientific Character of Early Museums,' 'The Arrangement of Old Museums,' 'The Modern Museum,' 'Use of Museums.' These are some of the headings culled from the table of contents, which will define the scope of this valuable work. Mr. Murray evidently likes to begin at the beginning. 'Those authors who undertake to treat of Museums in a thorough and exhaustive manner find in Noah's Ark the most complete Museum of Natural History that the world has ever seen. Coming to later times, they make sure that King Solomon had a collection of curiosities; and when King Hezekiah in a boastful mood showed the envoys of the Kings of Babylon all the house of his precious things, the silver and gold, and the spices and the precious oil, and all that was found in his treasures, they are certain that he took them round his museum.' Perhaps the revival of learning in the fifteenth century which led to such an admiration of monuments of classical antiquity and a desire for their preservation resulted in the formation of the museum as we know it to-day. Between 1450 and 1550 the Popes and Princes permitted and carried on

* Three volumes. Glasgow: James MacLehose & Sons. 30s.

vast excavations on ancient sites, resulting in the palaces being filled with antiquities unearthed in ancient Rome and its vicinity. Later, we find coin collecting is the craze, and to a certain extent the intelligence of the wealthy individual was estimated by the collection of coins he had gathered together. Then the interest seems to change, and as time advances the idea of a museum, or, more correctly speaking, a 'collection,' changed. It was then the greatest number of rarities and curios in the Natural History line that gave the most interest to private and public collections. No museum was complete without a Unicorn's horn, the egg of a Griffin, part of a mummy, or the bones of a giant.

Scores of mammoth bones and teeth were labelled and exhibited as remains of ancient giants until someone proved that the bones were of elephants and not of man, but even then the specimens remained with their old labels for some considerable time.

Following that period we find, perhaps, a little advance in the nature of the collections in our museums, though not a very great one. In the 'Art Journal' for 1872 is a description of one of our Yorkshire museums, from which the following extract is given:—'The usual class of foreign 'curiosities' which characterise most museums are here perhaps more than usually abundant and interesting, and there are also a considerable number of local and other relics of mediæval and more recent times, including a fine and highly-important collection of Yorkshire seals. The miscellaneous character of the 'curiosities' of the collection may easily be estimated from the enumeration of half a dozen of what are considered by some to be the attractions of the place—'a part of a walking-stick belonging to Queen Elizabeth,' 'a pair of cavalier's boots worn by Sir E. Varney, who bore the royal standard of Charles I. at the battle of Edgehill,' 'some of the long corn among which the English Guards stood upon the field of Waterloo,' 'a piece of the rock against which General Wolfe leaned when mortally wounded at the taking of Quebec,' 'some bar shot fired by Paul Jones,' 'a lock of Napoleon's hair,' 'an autograph of Queen Victoria,' and 'a piece of the tanned skin of Thompson the murderer!' Such a collection was fairly typical of the contents of the average provincial museum so recently as a quarter of a century ago.

Mr. Murray's account of the beginning of the British Museum is very interesting. In 1753 an Act was passed accepting the custody of the collection made by Sir Hans Sloane

upon the conditions he stipulated. The Act further authorised the raising of the funds required by means of a lottery, and in this way £95,000 was obtained. The Sloane Collections and others acquired about the same time became the British Museum, which was opened to the public on the 15th January 1759. It is interesting to find that one of the most eminent benefactors to the British Museum was Sir Joseph Banks, whose collections necessitated a special department being devoted to Botany, in 1827.

In Mr. Murray's work, being really the outcome of a paper read to the Glasgow Archæological Society, it is only natural that Scottish museums and collections should take a prominent part. Still there is nothing in the book but what must be of the greatest value, not only to people particularly interested in museums, but also to all educated people. As an appendix Mr. Murray gives a list of the museums in the United Kingdom, based upon the list prepared by the 'British Museum Association' in 1887. It would have been better, perhaps, had Mr. Murray checked his list with the Museum Directory now being issued by the Museums' Association in their Journal, which, at any rate, would have supplied information to have enabled him to have filled in some of the blanks in certain museums.

With regard to Yorkshire, the information given in the list of museums is hardly sufficiently up-to-date. Places enumerated as possessing such institutions are:—Aldborough, Bradford, Giggleswick, Halifax, Huddersfield, Hull, Kirkleatham, Leeds (three of the museums here enumerated being owned and supported by the Yorkshire College), Malton, Middlesbrough, Richmond, Scarborough, Sheffield, Wakefield, Whitby, and York. Of the Museums at Barnsley, Doncaster, Driffield, Keighley, Grassington, and Selby no mention is made, though some of those enumerated by Mr. Murray are much below the standard of those omitted. These deficiencies, however, are comparatively of slight nature, and do not detract from the value of the work as a whole.

The Second and Third Volumes of Mr. Murray's work are devoted to a Bibliography of the literature dealing with the various museums, a work which must have taken an enormous amount of time and research in its preparation, and which, though naturally deficient in certain directions, has, at any rate, supplied reference to certain literature of the museum under the charge of the writer, of which he was previously in ignorance.

T. S.

Naturalist.

ECONOMIC FUNGI.

PART III.

J. H. HOLLAND, F.L.S.,
The Museum, Kew.

(Continued from p. 96.)

- BOLETUS FLAVUS With. Europe. In woods. Edible.
- BOLETUS GRANULATUS Linn. Europe, Siberia, and North America. In woods. Edible.
- BOLETUS AFFINIS Pk. North America. On ground. Edible.
- BOLETUS BREVIPES Pk. North America. On ground. Edible.
- BOLETUS CLINTONIANUS Pk. North America. In woods. Edible.
- BOLETUS EDULIS Bull. var. CLAVIPES Pk. North America. In woods. Edible.
- BOLETUS FLAVIDUS Fr. Europe, Siberia, and America. In woods. Edible.
- BOLETUS FRAGRANS Vitt. Britain. In woods under Oaks, etc. Edible.
- BOLETUS GRISELLUS Pk. North America. Edible.
- BOLETUS SPECTABILIS Pk. North America. On the ground. Edible.
- BOLETUS SUBAUREUS Pk. North America. On the ground. Edible.
- BOLETUS SUBGLABRIPES Pk. North America. In woods. Edible.
- BOLETUS VERSIPELLIS Fr. Europe and North America. In woods. Edible.
- COLLYBIA ESCULENTA Fr. Europe, North America, and Australia. Pine woods. Sold in Vienna for flavouring sauces.
- COLLYBIA FUSIPES (Bull.) Fr. Europe. At base of trunks of Oaks, etc. Edible.
- COLLYBIA PLATYPHYLLA Fr. Europe and North America. On trunks of Birch, Beech, etc. On the ground in woods among dead leaves. Edible.
- COLLYBIA RADICATA (Rehl.) Fr. 'Rooted Collybia.' Europe, North America, South Africa, and Australia. On trunks. Edible.
- COLLYBIA VELUTIPES (Curt.) Fr. Europe, Siberia, and North America. On trunks of Beech, Willow, etc. Edible.
- CLITOPILUS ORCELLA (Bull.) Fr. Europe. In woods. Edible.
- CLITOCYBE CLAVIPES Pers. North Europe. On ground. Edible.
- CLITOCYBE GALLINACEA (DEALBATUS) Scop. 'Ivory Clitocybe.' Europe. In Willow and Fir Plantations, etc.
- CLITOCYBE GEOTROPA Bull. Europe, Siberia, and North America. In woods. Edible.
- CLITOCYBE MONADELPHA Morg. Ohio. On ground.
- CLITOCYBE MULTICEPS Pk. North America. On ground. Edible.
- CLITOCYBE NEBULARIS Batsch. Europe and America. On ground. Edible.
- CLITOCYBE ODORA Sow. Europe and North America. In woods, Pine forests, etc. Edible.
- CANTHARELLUS CIBARIUS Fr. Europe, North America, Brazil, and Australia. In woods. Edible.
- CANTHARELLUS CINNABARINUS Schw. 'Cinnabar Chantarelle.' North America. Edible.
- CANTHARELLUS FLOCCOSUS Schw. Pennsylvania and Virginia. In Beech woods. Edible.
- CANTHARELLUS LUTESCENS Fr. Europe and North America. In woods. Edible.

- CANTHARELLUS INFUNDIBULIFORMIS (Scop.) Fr. Europe and North America. On ground. Edible.
- CRATERELLUS CANTHARELLUS (Schw.) Fr. North America. On ground. Edible.
- CRATERELLUS CORNUCOPIOIDES (L.) Pers. Europe, Siberia, North America, Ceylon, and Malacca. In woods. Edible.
- CLAVARIA AMETHYSTINA Bull. Europe, North America, and New Zealand. On ground. Edible.
- CLAVARIA AUREA Schæff. Europe, North America, and Australia. In woods. Edible.
- CLAVARIA BOTRYTES Pers. Europe, America, and Australia. In Beech woods, etc. Edible.
- CLAVARIA CINEREA Bull. Europe (France, Italy, and Britain) and Brazil. In woods. Edible.
- CLAVARIA CORALLOIDES Linn. Europe and Victoria. In woods. Edible.
- CLAVARIA FASTIGIATA Linn. Europe, Siberia, North America, and Australia. In woods. Edible.
- CLAVARIA PISTILLARIS Linn. var. 'UMBONATA' Pk. Europe, North America, and Cape Colony. Edible.
- CLAVARIA RUGOSA Bull. Europe, North America, and Queensland. In woods. Edible.
- CORTINARIUS CORRUGATUS Pk. North America. On ground. Edible.
- CORTINARIUS EVERNIUS Fr. Europe and North America. On ground. Edible.
- DOTHIDEELLA TINCTORIA Sacc. 'Dyeing Chilca.' South America. Parasitic on the leaves and stems of *Baccharis polyantha*, *B. genistelloides*, and other species of the temperate regions; covering as a black powder the above-mentioned Composites, from the diseased leaves of which the Indians manufacture a green dye, used for dyeing their blankets and clothes.
- FISTULINA HEPATICA Fr. Europe, North America, East Indies, and Australia. On trunks of Chestnut, Beech, and Oak. 'The Beefsteak Fungus.' Edible.
- GYROMITRA ESCULENTA (Pers.) Fr. Europe and North America. In Pine woods, on moist banks, etc. Edible, but under certain conditions said to be dangerous.
- GYMNOSPORANGIUM SABINÆ (Dicks.) Wint. 'Cedar Apples.' Europe and North America. On leaves of *Pyrus communis*, etc., and branches of *Juniperus sabina*. Anthelmintic.
- GYMNOSPORANGIUM MACROPUS (Link.). 'Cedar Apples.' North America. On leaves of *Amelanchier canadensis* and other Rosaceous trees, and on branches of *Juniperus virginiana*. Anthelmintic.
- HELVELLA CALIFORNICA Phillips. Sierra Nevada Mountains. On the ground in forests. Edible.
- HELVELLA ELASTICA Bull. North America. On decaying trunks, etc. Edible.
- HELVELLA INFULA Schæff. Europe, North America, and Kamtschatka. On ground, and on decaying trunks, etc. Edible.
- HELVELLA LACUNOSA Afzel. Europe (Britain, etc.) and North America. On ground. Edible.
- HELVELLA SULCATA Afzel. Europe, North America. On decaying trunks, etc. Edible.
- HYDNUM ALBIDUM Pk. North America. In woods. Edible.
- HYDNUM CAPUT-URSI Fr. Sweden, North America, etc. On trunks, etc.
- HYDNUM ERINACEUM Fr. Europe and North America. On trunks of Beech and Oak. Very good when young.

- HYGROPHORUS BOREALIS Pk. North America. In woods, on ground. Edible.
- HYGROPHORUS CERACEUS (Wulf.) Fr. Europe, North America, Ceylon, Australia, Kamerun. In open woods, amongst grass, and in meadows. Edible.
- HYGROPHORUS CHLOROPHANUS Fr. Europe, North America, and Ceylon. Open woods. Edible.
- HYGROPHORUS CHRYSODON Fr. Europe and North America. In woods. Edible.
- HYGROPHORUS COCCINEUS (Schæff.) Fr. Europe and North America. In woods and meadows. Edible.
- HYGROPHORUS CONICUS Fr. Europe, North America, Nigeria, Ceylon, Thibet, etc. In woods and pastures. Edible.
- HYGROPHORUS EBURNEUS (Bull.) Fr. Europe, Siberia, and North America. In woods and meadows. Edible.
- HYGROPHORUS ERUBESCENS Fr. Europe and North America. In Pine woods. Edible.
- HYGROPHORUS FLAVO-DISCUS Frost. North America. In Pine woods. Edible.
- HYGROPHORUS FULIGINEUS Frost. North America. In Pine woods. Edible.
- HYGROPHORUS HYPOTHEJUS Fr. Europe and North America. In Pine woods, among heather, etc. Edible.
- HYGROPHORUS LARICINUS Pk. Larch Hygrophorus. North America. Edible.
- HYGROPHORUS MINIATUS Fr. Europe, North America, Ceylon, and Queensland. Growing under various conditions. Edible.
- HYGROPHORUS NITIDUS B.&C. North America. In damp places. Edible.
- HYGROPHORUS PENARIUS Fr. Europe, North America, and Brazil. In mixed woods, Beech, etc. Edible.
- HYGROPHORUS PUNICEUS Fr. Europe, North America, and Spitzbergen. In meadows. Edible.
- HYGROPHORUS SPADICEUS (Scop.) Fr. Europe. On ground. Mentioned as being used for ketchup.
- HYGROPHORUS SPECIOSUS Pk. Europe and North America. In meadows, etc. Edible.
- HYGROPHORUS VIRGINEUS Fr. Europe, North America, and South Africa. On ground. Edible.
- HYGROPHORUS NIVEUS Fr. Europe and North America. In meadows. Edible.
- HYGROPHORUS PRATENSIS (Pers.) Fr. Europe, Siberia, and North America. In meadows. Edible.
- HYPHOLOMA APPENDICULATUM (Bull.) Fr. Europe, America, and Abyssinia. In woods, on stumps. Edible.
- HYPHOLOMA CAPNOIDES Fr. Europe and North America. In Pine and other woods, on ground and on stumps. Edible.
- HYPHOLOMA FASCICULARE Huds. Europe, North America, Ceylon, Tasmania, etc. On decaying trees and stumps and on ground. Edible according to McIlvaine. Considered dangerous in this country.
- HYPHOLOMA INCERTUM Pk. North America. On ground. Edible.
- HYPHOLOMA VELUTINUM Pers. Europe and North America. On ground. Edible. Often used in ketchup.
- HYPHOLOMA PERPLEXUM Pk. North America. On decaying trunks, etc. Edible.
- LEPIOTA ACUTESQUAMOSA Wein. Europe and North America. In woods and gardens. Edible.
- LEPIOTA AMERICANA Pk. North America. On ground. Edible.

- LEPIOTA GRANULOSA Batsch. Europe, North America, and Australia. Open woods. Edible.
- LEPIOTA LENTICULARE Lasch. Europe and North America. In Pine woods. Edible.
- LEPIOTA NAUCINA Fr. Europe and North America. On ground. Edible. Difficult to distinguish from *Amanita phalloides*, which is undoubtedly a poisonous species.
- LEPIOTA RACHODES Vitt. Europe, North America, and Australia. In shady pastures and in greenhouses. Edible.
- LACTARIUS CHELIDONIUS Pk. North America. In Pine woods. Edible.
- LACTARIUS DISTANS Pk. North America. In grassy places. Edible.
- LACTARIUS GERARDII Pk. North America. In woods and shady places.
- LACTARIUS INSULSUS Fr. Europe and North America. In woods and shady places. (Described as uncertain in Britain.) Eaten in the United States.
- LACTARIUS SUBDULCIS Fr. Europe, Siberia, and North America. In woods. Edible.
- LACTARIUS PIPERATUS (Scop.) Fr. Europe, Siberia, and North America. In woods and grassy places. Edible. Described sometimes as poisonous, and, at the best, good food when better cannot be had.
- LACTARIUS VOLEMUS Fr. Europe and North America. In woods. Edible.
- MORCHELLA CRASSIPES Pers. Europe and North America. Grassy places. Edible.
- MORCHELLA HYBRIDA Pers. Europe and North America. On ground. Edible.
- PAXILLUS INVOLUTUS Fr. Europe and North America. In woods, on ground. Edible.
- PHOLIOTA ADIPOSA Fr. Europe and North America. On Beech trunks. Caps said to be good to eat.
- PHOLIOTA PRÆCOX (Pers.) Fr. Europe, North America, Siberia, and Australia. On ground. Caps only said to be edible.
- PLEUROTUS POMPETI Fr. Europe and North America. On trunks of *Pyrus Malus*, etc. Edible.
- PLEUROTUS TESSULLATUS (Bull.) Fr. Europe and North America. On Elm and Maple trunks. Edible when young and tender.
- PLEUROTUS ULMARIUS Fr. Europe and North America. On trunks of Elm and Maple. Edible when young and tender.
- POLYPORUS BERKELEYI Fr. North America (Carolina, etc.). Edible.
- POLYPORUS CONFLUENS Fr. Europe, North America, and Australia. Pine woods. Edible.
- POLYPORUS CRISTATUS Fr. Europe and North America. Beech woods and open grassy places. Edible.
- POLYPORUS GIGANTEUS Fr. Europe and North America. On trunks of Hornbeams, Pines, etc. Edible when young.
- POLYPORUS INTYBACEUS Fr. Europe and North America. On trunks of Oak trees, etc. Edible when young.
- POLYPORUS LEUCOMELUS Fr. Europe and North America. In Pine woods. Edible.
- POLYPORUS OVINUS (Schæff.) Fr. North America. On ground, in Pine woods. Edible.
- POLYPORUS PORIPES Fr. North America. On ground. Edible.
- POLYPORUS SQUAMOSUS (Huds.) Fr. Europe and North America. On trunks of Ash, Willow, and Elm. Edible. Said to make good razor strops.
- POLYPORUS SULPHUREUS Fr. Europe, North America, East Indies, Siberia, Cuba, Ceylon, and Tasmania. On trunks of Cherry, Beech, Oak, Willow, Poplar, Larch, etc. Edible. Recommended as a yellow dye.

- POLYPORUS UMBELLATUS Fr. Europe and North America. On decaying stumps. Edible.
- RUSSULA ALUTACEA Fr. Europe, North America, and Kashmir. Edible, fresh plants having the best flavour.
- RUSSULA DECOLORANS Fr. Europe and North America. Pine woods. Edible.
- RUSSULA HETEROPHYLLA Fr. Europe and North America. In woods. Edible.
- RUSSULA LACTEA Fr. Europe and North America. In Beech and mixed woods. Edible.
- RUSSULA LEPIDA Fr. Europe and North America. In Beech woods. Edible.
- RUSSULA OCHROPHYLLA Pk. North America. Under Oak trees, etc. Edible.
- RUSSULA ROSEIPES Bres. Europe and North America. Pine woods.
- RUSSULA VESCA Fr. Europe and North America. In woods. Edible. Said to be one of the best of the *Russulas*.
- RUSSULA VIRESCENS Fr. Europe and North America. In woods. Edible.
- TRAMETES CINNABARINA Fr. Europe and Siberia. On Birch, Beech, Oak trunks, etc. Retinic acid has been extracted. ('Bot. Microtechnique,' Zimmerman, 1893.)
- TREMELLA ESCULENTA Mass. China. Worth from 8 to 24 taels a cutty (is. 3d. per lb.) A great delicacy at a Chinese dinner.
- TREMELLODON GELATINOSUM Pers. North America. On trunks of Fir, etc. The only gelatinous spiny fungus. Bears a great resemblance to *Hydnum*, which generic name it once bore. Edible.
- TRICHOLOMA ALBELLUM Fr. Europe and North America. On ground. Edible.
- TRICHOLOMA BREVIPES (Bull.) Fr. Europe and North America. In plantations. Edible. Very good eating.
- TRICHOLOMA PORTENTOSUM Fr. Europe, Siberia, and North America. Pine woods. Edible.
- TRICHOLOMA RUSSULA Trat. Europe and North America. Woods. Edible.
- TRICHOLOMA TERREUM (Schæff.) Sow. var. FRAGRANS (Pk.). North America. In open Pine woods and on ground under trees. Edible.
- TUBER MAGNATUM Pico. 'French Truffle.' France, Germany, and Italy. Underground. Edible.
- TUBER MESENTERICUM Vitt. Germany, Italy, France, etc. In woods. Edible. Sold for about half the price of *Tuber brumale*.

LEPIDOPTERA.

Early Appearance of *Larentia multistrigaria*.—I have been taking *Larentia multistrigaria* since 25th January. Is not this exceptionally early?—R. T. CASSAL, Brook Villa, Ballaugh, Isle of Man, 22nd February 1905.

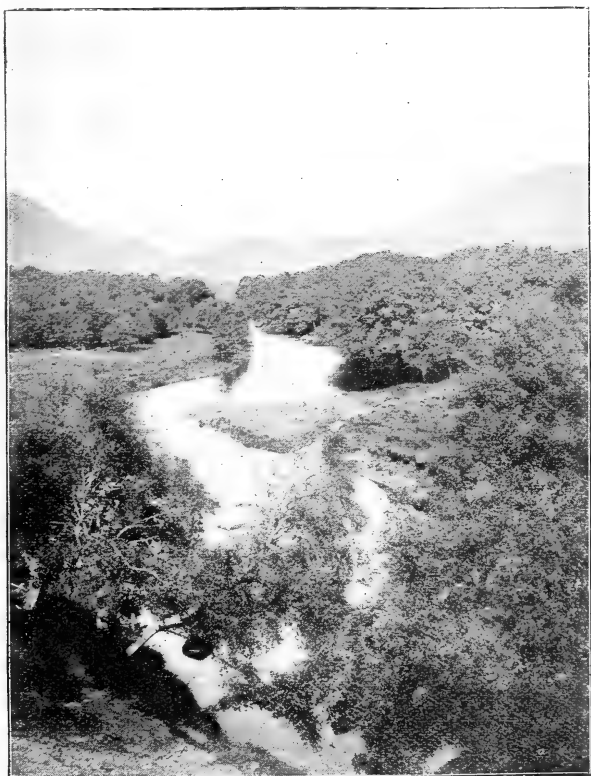
[We have never seen *L. multistrigaria* on the wing before February, which we regarded as unusually early, as the ordinary time in West Yorkshire for it to be fully out appears to be about the first week in April. But the very mild weather in January this year brought out the spring moths, and we hear of *Phigalia pilosaria* being common in the South by the end of the month.—G. T. P.]

REVIEWS AND BOOK NOTICES.

The Botanical Survey of Scotland. Parts III. and IV. Forfar and Fife. By the late **Robert Smith, B.Sc.**, and **William G. Smith**, University of Leeds. (The 'Scottish Geographical Magazine,' XX. and XXI., December 1904 and January, February, March 1905; 70 pp., 17 figures and 2 maps.)

It is almost natural that the botanical survey of Britain should begin on the hills and moors of Scotland and the Pennines of England, which in former days did so much towards inspiring the pioneers of the Geological Survey. It is on the moors best of all that the botanist feels at first the chaos of vegetation, but perceives at length that the changes of vegetation are ordered and determined by conditions of climate and soil. The survey of Forfar and Fife, though the most recent of the series of botanical surveys, is in reality the parent stock of the papers already published on the vegetation of the Edinburgh District, Northern Perthshire, Yorkshire, and Westmorland. For it was in the fields, hedges, and woods of Fife that the late Robert Smith recognised his first plants and made an herbarium; it was during excursions round Dundee with a working-men's field club that he added knowledge of plants; and it was in University College, Dundee, as undergraduate, and then as Assistant Professor, that he evolved the main ideas which control botanical survey in Britain to-day. The two maps and some of the matter of this paper were left incomplete by its original author, and have been completed and edited by his elder brother. The maps are an interesting record of vegetation, for the area is intersected by Strathmore, 'the great valley,' which has ever separated the Highlanders of Scotland from the Lowlanders. The vegetation shows the same influence, for it is lowland in type to the south of Strathmore, and highland to the north of it. The map of Forfar is as near to an ideal vegetation map as any enthusiast may wish, for the zones of vegetation follow in almost parallel sequence from the sea-coast to an altitude of over 3,000 feet. Contrasting the matter of the paper with that of the Yorkshire surveys (see 'Naturalist,' June 1903, p. 221, and September 1903, p. 377; also Lewis, 'Geographical Journal,' 1904), there are several topics of interest. The woodland includes much of the Birch Wood (see figure), which once was widespread in Yorkshire, but is now reduced to small scattered remnants. A brief description is given of the vegetation in Caenlochan Forest, probably the highest forest of large size in Britain—its upper

limit reaches 2,500 feet. The moorland zones of vegetation are: (1) a lower zone of grass heath and heather associations covering the Sidlaw-Ochil ranges, and again represented on the foothills of the Grampians north of Strathmore; (2) an extensive Grampian zone of heather moors, on fairly uniform schistose formations; (3) a higher zone of grassy moors on a geological area of disturbed and contorted strata; (4) an Arctic region with an altitude of from 2,500 to 3,500 feet on the plateau



Birch Wood in Glen Clova, looking up the South Esk.

(Reproduced by permission from photo by Frank Sharp, Esq., Dundee.)

between Strathmore and the Dee valley. The higher zone of grassy moors is an extensive tract which in Yorkshire is only found as a summit pasture on Great Whernside, Ingleborough, Crossfell, and other hills. The Arctic region includes the classic botanical localities of Clova and Caenlochan. Along the North Sea coast, maritime vegetation is well represented in cliffs, sand

dunes, and mud-flats. The vegetation of the estuary of the Tay (described by a veteran Perth botanist, Mr. W. Barclay) is an interesting confirmation of the distinctions between maritime and estuarine vegetation, pointed out, in the case of the Humber, by the author of 'The Flora of the East Riding of Yorkshire.' A section of the paper deals with the vegetation of lochs, marshes, and bogs. A theme running through the whole paper is that natural groups of plants fall into two great divisions—those which result from a water-supply comparatively rich in available plant-food (e.g., oak wood, grass moor, lowland lake, and marsh), and those resulting from a poor food supply (e.g., pine wood, heather moor, highland lake, and bog). The associations recognised in the botanical surveys of Scotland and Yorkshire are classified in a summary, and it is at once obvious how much the Pennine surveys have contributed to our knowledge of the plant associations of Britain.

These papers form a valuable contribution to our knowledge of plant associations, and will be indispensable to all interested in the study of vegetation. Dr. Smith is to be congratulated on the energy he has shown in prosecuting a work which is rapidly bringing this country to the front in the study of this branch of ecology. Little in the way of criticism is called for. The use of plate paper for the illustrations would have greatly improved the appearance of the work, and we notice that the author of 'Cybele Britannica' rejoices in still another name, 'Hugh Coterill Watson.'

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Hints on Collecting and Preserving Plants. By S. Guiton. Pages II. + 55. West, Newman & Co. 1s.

This handy little volume may be safely recommended to young botanists as a guide to collecting and preserving plants. It has evidently been written by one who takes great pride in his collections, and though the instructions are at times elaborate, it is important that a beginner should pay great attention to good methods of pressing, mounting, and labelling, and so make his specimens tell all they possibly can. This in itself is a useful training, and a collection prepared on the lines indicated by the author will be much more valuable than those commonly met with. The outfit recommended, however desirable it may be, is so cumbrous that many will shrink from the attempt. We believe equally good results may be obtained by much more simple means, but this the botanist will soon discover for himself. The book contains many useful hints, and will be found both helpful and suggestive to the collector.

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The 'Annual Report of the Museums and Meteorological Observatory of Bolton for 1904' is to hand. The principal addition to the Natural History Section is the People's Collection of British Birds' Eggs, bequeathed by the late J. P. Thomasson. It contains about 7,200 specimens, including 70 examples of Cuckoos' eggs, with those of their foster-parents; also a series of 650 carefully selected eggs of the Guillemot.

Naturalist,



1 APR. 1905

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NOTES AND COMMENTS.

YORKSHIRE GEOLOGY.*

THE annual publication of the Yorkshire Geological Society has recently been received, and, like its predecessors, is a valuable contribution to the geology of our county. For wealth of illustration the volume also equals, if not excels, that of any previous year. In addition to sketches, etc., in the text, there are no fewer than 34 plates and folding maps. The publication is not devoted exclusively to Yorkshire, but on account of the



Dry Valley cutting through the Pennine Divide between Combe Hill and Crow Hill.

interest attached to the drifts of East Anglia, the inclusion of two papers, by Mr. F. W. Harmer, dealing with that area, is accounted for. The principal paper in the volume is on the 'Underground Waters of Ingleborough,' and it is in connection with this that there is such a number of maps, diagrams, and plates. Messrs. A. Jowett and H. Brantwood Muff contribute the 'Glaciation of the Bradford and Keighley District,' which is accompanied by a valuable contoured map of the area. Mr. S. W. Cuttriss gives a Bibliography dealing with the Yorkshire Caves, which seems to be very complete as regards recent

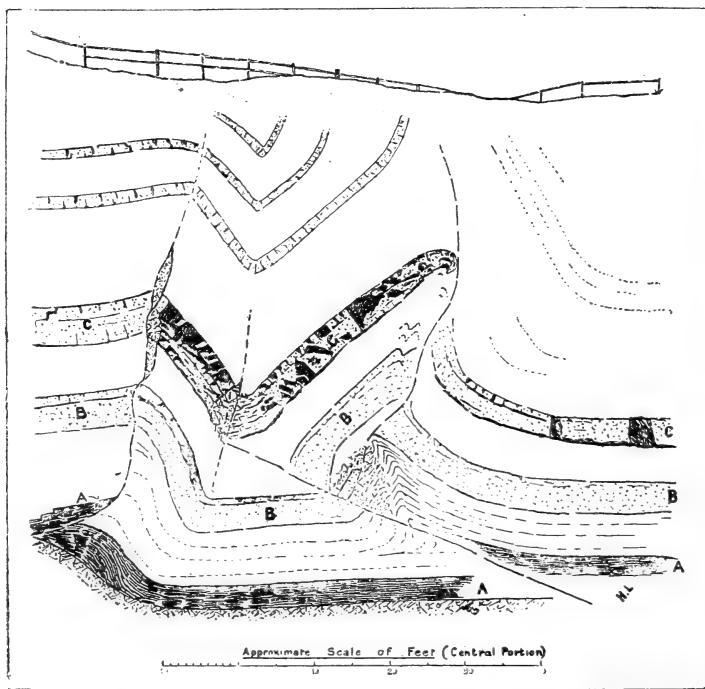
* Proc. Yorks. Geol. and Polytechnic Society, 1904, Vol. XV., Part 2.

literature. Of some historical interest is the copy of the map drawn by Mr. Wood to accompany the well-known paper on the 'Glacial Deposits of Lincolnshire and South-East Yorkshire,' printed by the Geological Society of London in 1867. It appears the map was originally prepared for publication in the 'Quarterly Journal of the Geological Society,' but after it had been lithographed was rejected on the ground that it was not sufficiently artistic! It is pointed out that this map is the first of its kind in existence.

We are indebted to the Yorkshire Geological Society for the use of the two specimen illustrations from their excellent volume (see Plate VIII.).

CONTORTED STRATA IN DERBYSHIRE.

The following illustration of a remarkable contortion in the Yoredale Shales, is reproduced by permission from the 'Proceedings of the Geologists' Association,' and appears in an account of an excursion of the association to North Derbyshire. It will be seen that the beds, which were exposed during excavations



Contorted Beds in the Derwent Valley, Derbyshire.

Naturalist,

for the foundations of the 'Howden' Dam, have been folded, faulted, and packed in a remarkable manner. A is a distinctive bed of Carbonaceous Black Shales; B and C are two separate Sandstone beds, each about four feet in thickness.

THE MAKING OF EAST YORKSHIRE.

THOMAS SHEPPARD, F.G.S.

(Continued from p. 115.)

Between the close of the cretaceous period and the next deposit in Holderness is a great gap in our geological history. There is not in Yorkshire, so far as is at present known, a single vestige of that great series of clays and marls and gravels forming the Tertiary system. These rocks in a variety of forms, and with fauna and flora representing a diversity of climatic conditions, accumulated in great thickness in the south-east of England, notably in the London basin, and also on the adjoining continent. What was going on in Yorkshire during this enormous period of time it is difficult to say; there can be little doubt that some of these deposits were actually formed in this county.

In many places on the chalk wolds are 'pipes' or deep hollows in the chalk,* generally only a foot or so wide, but extending to a great depth. It is found that in their lower parts they contain a great number of well-rounded pebbles of quartzite. Similar pebbles also occur in the lowermost layers in the pre-glacial gravels at Hessle and Sewerby, that is, in the deposits resting immediately upon the denuded chalk floor. These pebbles have come from somewhere, they are certainly not derived from the drift beds, and it can only be assumed that in such of these pipes that have been met with during quarrying operations, are preserved traces of a very ancient deposit which must at one time have covered the chalk, but which previous to the glacial period has become entirely swept from the face of the earth in these parts.

The next stage in the history of this district is evidently the fact that the channel in the chalk plateau which was formed by an immense river running along in a position occupied by the bed of the North Sea, gradually widened, cutting its way

* See 'The Naturalist,' 1904 (Quartzite Pebbles on the Yorkshire Wolds), pp. 9 and 54.

through the soft chalk. Eventually the ocean carried on the work originally started by the river, and between what is now the continent and Britain a gradually widening arm of the sea was formed.

On the west would be a long line of chalk cliffs. These receded towards our present shores, until finally a magnificent chalk cliff line presented its front to the seas washing over Holderness. This cliff still exists buried beneath the covering of glacial drift. At Sewerby the precise spot where the old cliff joins the present one can be seen; from which place it curves round through Driffield, Beverley, and Hessle, and across into Lincolnshire towards Donna Nook. From Bridlington to Hessle is was roughly 100 ft. in height. At the latter place, during some excavations a few years ago, the old cliff line which had been buried for thousands of years was exposed for a short distance. In those days Holderness, as we now know it, was unknown, and borings for wells, if carefully examined, indicate what we should naturally expect, namely, that the chalk floor under the drift gradually slopes and deepens towards the east.

The sea having got thus far was arrested in its work. The ice age and the débris it 'dumped' down in this district entirely altered the configuration of the country; on the melting of the ice the sea renewed its energies, and at the present day is slowly but surely regaining its old cliff line, which has been so long neglected and hidden away. At the average rate of over two yards per annum the Holderness cliffs are being washed away, and it would not be a difficult matter to estimate the probable number of years required for the sea to regain its former position.

With regard to this ancient cliff we have much interesting information; banked up against the perpendicular face of chalk occurs a series of gravel and sand forming the old beach deposit, upon which is a quantity of angular chalk-wash and blown sand. All these were formed before the advance of the ice-sheet, as the glacial drift occurs above them.

At Sewerby, and more recently at Hessle, excavations have been made in this ancient beach with interesting results. Mixed up amongst the sand and gravel are bones, teeth, and horns of extinct animals; some of which had been dragged into their position by Hyænas, as they still retain the strong teeth marks of those animals. Amongst the mammals represented in this way are the Elephant, Hippopotamus, Rhinoceros, Bison, Deer, and Horse. How strange would

appear an assemblage of the forms here represented at Bridlington or Hessle now !

‘Yes, where the huntsman winds his matin horn,
And the couched Hare beneath the covert trembles ;
Where shepherds tend their flocks, and grow their corn ;
Where fashion in our gay parade assembles,
Wild Horses, Deer, and Elephants have strayed,
Treading beneath their feet old Ocean’s races.’

This old beach is an example of the pieces of evidence one has to go upon in building up the history of any district. Were it not for the accidental capture of certain animals by Hyænas in far-off times ; and were it not for the still further accident of the few bones left after the meal being quickly covered up by blown sand ; and the still further accident that the particular sand in question was wedged in the angle between the cliff and the beach, where they were not destroyed by the moving ice mass ; and the still further accident that they were excavated for gravel or for other purposes ; and the yet further circumstance that geologists happened to see the bones when they were dug out and took care of them ; we should have had no knowledge whatever of these little interesting phases in the history of our district.

‘Seas more late in form and date
Spredde owre the self-same strande ;
And many a chaunge most wild and straunge
Reversedd the sea and lande.’
‘Thus if wee Nature’s works exhume,
Or owre past hystorie raunge,
We find both mann and Nature’s doome
Is one perpetual chaunge.’

No wonder then that we have many blanks in the geological record, the marvel is that the chain of evidence has so few missing links.

A careful examination of the nature of this pre-glacial beach gives proof that during its formation some change was going on in the district ; the water seems to have been receding from the cliffs ; the animals inhabiting the area indicate colder conditions. In other parts of England the Tertiary deposits most clearly prove that for a long time the climate of this country has been slowly but surely cooling ; the proportion of Arctic shells, etc., increases in each newer deposit, until finally the climax is reached in the Great Ice Age.

For some reason or other the climate of the Northern Hemisphere had become colder and colder as the centuries rolled on ; small glaciers began to form in the high

mountainous districts of Scandinavia, Scotland, the English Lake District and Wales. These glaciers increased in size until eventually several of them coalesced and flowed into the seas. In Great Britain there is evidence that glaciers from the high lands reached the North Sea by means of the valleys previously existing. From the English Lake District a huge glacier 20 miles wide filled Teesdale and entered the North Sea on the site of the present Tees' mouth. An arm of this broke through the valley side, and descended into the Vale of York, where, near York and Tadcaster, it left behind two of the most perfect terminal moraines to be found in these islands. The mountains of South-west Scotland, North-east Ireland, South-east Ireland, and Wales poured their superabundant ice into the Irish Sea; as the great masses of ice formed, the courses of smaller glaciers were diverted and changed, and we have absolute proof that the Irish Sea was filled with ice forming an immense ice sheet. Marks of glaciation occur on the summit of Snae Fell, at a height of over 2,000 feet; and animals such as the Irish Elk probably found their way over the ice to the Isle of Man at this stage in the history of our islands, where they perished and left their remains in the drift beds.

Whilst all this had been going on here, however, the centre of the glaciation in Europe, viz., the Scandinavian mountains (which at that time were much higher than they are to-day) was slowly but surely sending forth huge ice streams to the west and south and east. These ice streams carried with them characteristic rocks from their place of origin, which have been scattered like seeds over the North and West of Russia, the North German Plain, Denmark, and Eastern England. The Scandinavian ice entirely occupied the bed of the North Sea, and, on reaching our shores its force was such that it diverted southwards the enormous glacier coming from the Lake District down Teesdale. The combined ice of Teesdale and more northern streams coasted along East Yorkshire from north to south; the cliffs of Speeton, 440 feet in height, formed too abrupt a buttress to be entirely surmounted by the ice, and a great moraine consisting of gravel and clay, was deposited along the cliff edge between Speeton and Buckton. Speeton Windmill stands on the top of one of these morainic mounds. On reaching the lower part of the headland, however, where the chalk is only some 200 feet in height, the ice was able to over-ride the land, and the chalk is consequently covered with the boulder clay and deposits left by the melting ice.

Rounding the corner, the old bay of Holderness was entirely occupied by the invader, up to and beyond the pre-glacial chalk cliff, and that great mass of gravel, clay, and sand forming the land with which we are so familiar, east of the Yorkshire Wolds, is nothing more nor less than a terminal moraine of the glacier in question. In the gravel pit at Burstwick can be seen the nature of the material carried down by the ice. If examined closely the manner in which the glacier worked and the former direction of the moving ice can be ascertained. Rocks from Scotland, the Cheviots, and the English Lake District occur cheek by jowl with the limestones of Teesdale, the Lias fossils from Whitby, Oolitic fragments from Scarborough, chalk fossils from Flamborough, and various igneous rocks from Christiania. These latter are of particular interest, and a great variety of forms have been met with. In addition to the rocks are innumerable fragments and perfect examples of shells of an Arctic type torn from their home by the glacier, and with these also a number of bones of the Walrus, Irish Elk, Bison, Rhinoceros, Reindeer, and other animals are found.

There is a line of gravel mounds extending from Bridlington through Kelk, Brandesburton, Sproatley, and Burstwick towards Paull, which represents material deposited by the melting ice at one stage in its career. This chain of hills is of some interest, because at Paull the morainic mound there is responsible for the diversion in a south-westerly direction of the present Humber channel. Originally, as borings in Holderness prove (and as would naturally be expected on *a priori* grounds), the Humber flowed due east; the mantle of drift, which has done so much in Yorkshire for the diversion of the river channels, caused the Humber to change its course. It had to flow round the mound in which Paull battery has since been built, and continued its course in that direction. Where would Grimsby now be, were it not for the mound of gravel at Paull deposited by the Scandinavian glacier during the glacial period? Formerly the river Derwent emptied itself due eastwards into the sea. Its outlet, however, was blocked up by drift, the channel diverted into an entirely different direction, and to-day the waters of the Derwent instead of finding their way directly into the sea, have to flow right round the East Riding and reach their goal by way of York and Goole and the Humber. This is only one of many similar instances in this county.

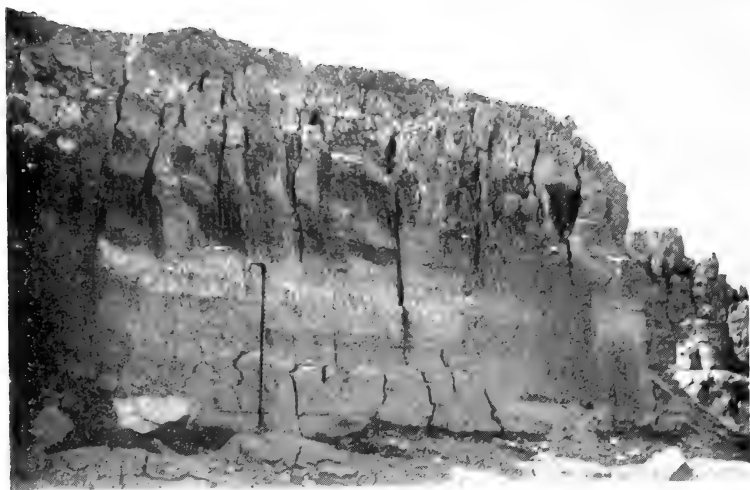
In addition to the changes already referred to, Prof. Kendall has recently shown* that during the glacial period the damming

up of the mouths of the valleys in North-east Yorkshire by the ice resulted in a number of lakes being formed, some of which were of enormous dimensions. They have left unmistakable traces of their former existence upon the land surface. In many cases the continual draining into these lakes by overfed streams resulted in the waters eventually escaping through cols or depressions upon the hills. The force of the waters escaping from the lakes has left deep gorges in the hill sides, which, though now dry, indicate the places where the water escaped; some of these are at great heights on the Cleveland moors. As in other parts of Yorkshire, and even in other parts of Britain, these old lakes have been most carefully and accurately mapped, and are known by such names as Lake Pickering, Lake Humber, etc.

As regards Lake Humber, this must have been a sheet of water of truly gigantic proportions, as can be readily understood if one assumes for the moment the probable effect of damming the estuary to-day. In glacial times there were two barriers across the Humber, one at Paull, and one crossing from North Ferriby to South Ferriby. The latter is a most interesting example; on either bank are still the remnants of the moraine which once existed at this point, and from clays and gravels there exposed, ice-scratched stones, far-travelled boulders, and other undoubted evidences of ice-action can be obtained.

Let us imagine the probable appearance of East Yorkshire on the final melting of the ice. Huge fans or sheets of gravel occur at Bridlington and other places as a result of the floods. Rounded hillocks of gravel and clay stand out in all directions; the hollows in between are filled with water, forming miniature lakes or meres. Of animal or plant life there is little or none. The climate gradually becomes milder; at first Arctic plants and animals exist in small numbers. Later, the margins of the meres become clothed in vegetation; peat is eventually formed, and huge trees of Oak and Fir thrive. The Red Deer, Beaver, Short-horned Ox, Otter, and wild Horse haunt the woods, and finally primitive man makes his appearance. The latter is able to hunt the animals in the forest. He lives upon the holmes or islands which, in his day, stood out from the surrounding morass. Since then, with the exception of Hornsea Mere, all our marshes and meres have been drained, and their sites are occupied by fertile fields; but the place-names Marton, Marfleet, Summergangs, Sand-le-Mere, and many others, in which the word 'Mar' or 'Mere' occurs, indicate the former existence of these sheets of water.





Skipsea Lacustrine Deposit, showing Shell-Marl and Peat.

During the erosion of the Holderness clay cliffs these old lake beds are cut into (see Plate V.), and an examination thereof supplies an interesting record of the former condition of things prevailing.

In the lowermost layers are remains of the dwarf Arctic Birch (*Betula nana*), a plant which does not thrive in the same surroundings to-day, and indicates the probable climatic conditions prevailing at the close of the glacial period.

Next we see that as the climate ameliorated, animals and plants with which we are more familiar thrived in the district; Oak, Scotch Fir, Beech, and Hazel grew in numbers, and in these woods lived the animals previously enumerated.

Later in some parts, and contemporaneously in others, the meres occupied parts of Holderness, and we find the remains of Pike and freshwater shells preserved in the marl, giving some indication of the former conditions which prevailed. Eventually, in mediæval or earlier times, the land was drained, cultivated, and became rich fertile fields.

Bearing somewhat on the making of East Yorkshire is the question of the first appearance of man in the district, whose influence, of course, has had some effect on the present aspect of the area. In other parts of England remains of palæolithic man are known. These principally consist of flint implements of a primitive type, which are found in association with remains of the Mammoth, Rhinoceros, and other animals now extinct. In Yorkshire in different places have been found bones of such animals, but hitherto no traces of palæolithic man have been met with. If they do occur they will probably be recorded in the pre-glacial sands and gravels at Sewerby and Hessle already referred to. Possibly they may occur in the gravel pit at Brough or at Bealsbeck, where traces of animals which have proved to be contemporary with palæolithic man elsewhere have been recorded. So far, however, we have no evidence of his existence in Yorkshire. We have abundant proof of Neolithic or the new Stone-Age man. He occupied this district when it was a land of meres and marshes. Mr. Boynton discovered at Ulrome, in 1880, a lake dwelling at a considerable depth from the surface, and associated with a peat deposit. The structure measured 90 ft. by 60 ft., and was held in position in the lake by piles of oak. Examination proved that two distinct habitations occupied the site. The lower one contained evidence of the earliest settlers in this district of which we have any

knowledge. It was obviously built before the introduction of metal. The piles had been roughly pointed, partly by burning and partly by the aid of stone implements. In association with it objects of bone and stone only were met with. Upon this lower structure a dwelling occupied by the Bronze-Age Britons was built; the stakes had been pointed by sharp metal implements, and a spear head of bronze found on the upper platform indicated the period at which it had been erected. The earlier occupants of the district undoubtedly lived here at the time the animals already enumerated, and possibly also the Irish Elk and Bison occupied the same area.

In addition to tilling the land and growing corn, these early inhabitants had a certain influence upon the present aspect of the surface of the land by the earthen structures they erected. At Skipsea Brough, and also at the so-called Danes' Dyke, earthworks of such magnitude were built for protective purposes as to almost appear to the uninitiated to be natural mounds.

The Wolds also are cut into and traversed in all directions by a series of earthworks and dykes, and are dotted over the surface with barrows or burial mounds containing the remains of former chiefs.

This subject, however, is too large to enter into in detail now, but the traces left behind by the Britons are sufficient from their magnitude to be referred to in a paper dealing with the origin of the present appearance of East Yorkshire.

To summarise, it has been my endeavour to show that almost every feature of East Yorkshire can be accounted for as a result of the survival of the fittest of hard rocks, as compared with softer ones; as a result of deposits formed by wind or water or ice, or by some agent such as we are familiar with at the present day. Almost the entire history of the district can be unravelled by means of the experience obtained from examining modern physical forces and their effects. It is not necessary to call in the aid of any great cataclysms or universal deluges or anything of the kind to explain the features of the district. The hills and dales and their origin have already been touched upon. The reasons the rivers do not always keep to the channels they originally cut has been explained. The prominences such as the Peak, Filey Brig, Flamborough Head, etc., exist on account of their comparative hardness. The reasons for the bays of Holderness, Filey Bay, Robin Hood's Bay, etc., have been pointed out. These are some of the principal features; examined in detail, however, one finds that

by the same law every minute gully, cave, or watercourse can be accounted for in the same way.

The geological history of East Yorkshire, in common with that of any other district, is one of extreme interest, and to understand that history aright one must examine the various documents in the field.

Emerson has truly said :—‘ Everything in nature is engaged in writing its own history ; the planet and the pebble are attended by their shadows, the rolling rock leaves its furrows on the mountain-side, the river its channel in the soil, the animal its bones in the stratum, the fern and the leaf inscribe their modest epitaphs on the coal, the falling drop sculptures its story on the sand and on the stone—not a footstep on the snow or on the ground, but traces in characters more or less enduring the record of its progress.’

To anyone in need of a hobby let me recommend geology. There is always some new fact to learn, some new problem to solve.

‘ There is not lost
One of earth’s charms ; upon her bosom yet,
After the flight of untold centuries,
The freshness of her far-beginning lies,
And yet shall live.’

ORTHOPTERA.

***Panchlora exoleta* at Huddersfield.**—On the 18th March a specimen of this pale green Cockroach was captured in our wholesale market and given to me. — W. E. L. WATTAM, Newsome.

FUNGI.

New Yorkshire Fungi.—I have to record two additions to the list of Yorkshire fungi. These are *Sordaria* (*Philocopra*) *pusilla* Mont. and *S. (Philocopra) pleiospora* Wint. Both species were found on rabbit droppings collected in Ecclesall Wood, Sheffield, in the spring of 1903. For the identification of the former species I am indebted to Dr. C. B. Plowright, and I understand from him that it is a Belgian species and has not previously been recorded from this country. The latter has only recently been found in this country, being described and figured in Messrs. Masee and Salmon’s paper on ‘Coprophilous Fungi’ in the ‘Annals of Botany,’ June 1901.—THOS. GIBB, Wirksworth, April 1905.

THE SINGING TIME OF BIRDS: NOTES MADE IN THE NEIGHBOURHOOD OF SCARBOROUGH.

W. GYNGELL,

Scarborough.

IN singing, birds use a different organ to that employed by man for the same purpose, which we know as the larynx; situated in the *upper* part of the windpipe. The syrinx, found only in birds, is, on the contrary, situated at the *lower* end of the trachea and adjoining parts of the bronchi.

It is, perhaps, not necessary to describe this organ which, variously developed in the different families of birds, is their sole voice instrument, the tongue not being used in any way connected with this purpose.

The next point to make clear is what naturalists mean when they speak of the *song* of a bird, and as probably no two people agree as to what birds can and what cannot sing, some saying that the Thrush sings and others maintaining that it only whistles, I shall for once agree with the poet who says: 'Loud swells the *song* of chanticleer.' 'Out on ye, Owls, nothing but *songs* of death,' and of the Cuckoo, 'In May, he *sings* all day.'

Taking the fullest latitude, I shall then include amongst bird songs the bubbling call of the Little Grebe, the weird and eerie spring voice of the Curlew, the grating cry of the Corn Crake, and other of those vocal efforts of birds which are generally used in courting the opposite sex, to send forth a challenge or greeting to another bird of the same species, to form part of a duet with another individual, or a voice unit in one grand chorus.

But before dealing with the song proper, I should briefly refer to the general language of birds which, in some respects the highest of all earthly animals, have a vocabulary in scope far exceeding what even the ordinary naturalist would suppose; and further, it is my belief, supported by personal observations, that birds can and do *talk*, or, if you like, utter sounds or signal notes to each other which, under ordinary circumstances, the human ear is incapable of perceiving.

As examples of bird language we have:—

- (1) The 'Halloa' or 'Good morning' call, when one bird first meets another of the same species.

- (2) The call of intimidation—'Get away' or 'That is my worm.' The Kittiwake Gull really does say, 'Get away.'
- (3) The much stronger cry, meaning 'Let me alone,' when one bird interferes with another.
- (4) A still stronger *shriek*, used by small birds when trying to drive away a Cat or Hawk.
- (5) The call of welcome when others of the same species join a party.
- (6) The half-timid, faint call which seems to say, 'Is it *safe* to feed here?'
- (7) The amorous call only used by the male at breeding time.
- (8) The responsive cry of the hen bird at this time.
- (9) The full *song* embracing a variety of notes often sung by the male *at* his mate. At such time the cock bird often works himself into a perfect frenzy whilst the female usually stands by quite indifferent to what he is doing.
- (10) The peeping cry of the young bird before it comes out of the egg.
- (11) The call of the young when waiting in the nest for parents to return with food, especially noticeable in young starlings.
- (12) The still louder call of the young whilst being fed, which seems to say, 'Oh! *don't* forget *me*.'
- (13) The call of parent bird to gather the chicks together when able to run, as in the common fowl, or, possibly, to make them stampede and hide, as the Pheasant seems to do.

Mr. E. Kay Robinson recently gave a list* of 21 different forms of bird language.

Some birds seem to talk quietly to themselves, and as an example may be mentioned the Tree Creeper, which keeps up a continuous faint sound like 'tick-tick-tick-tick' whilst running up a tree.

Many birds of the Plover family (such as the Lapwing) seem to resent the presence of man on what the birds regard as their domain, shouting at and bullying him whenever he comes near, especially, but not only, in the nesting season.

And then, when on migration at night, in the autumn or spring, birds mystify ornithologists by calling to each other in

* Field Naturalists' Quarterly, 1903, p. 100.

a language so different to that which they employ at other times that the most experienced are quite incapable of identifying, by voice alone, birds which pass in numbers and are probably all familiar species.

Civilisation in the barn door fowl is responsible for a new emotion, which is expressed by the cackling of the hen when she has laid an egg. I believe no wild bird does this.

Those who have paid any attention to wild birds kept in confinement must have remarked the many different notes as well as gesticulations which they use to express various feelings. My pair of Bullfinches have a very large vocabulary. Directly they feel that it is time to rise in the morning they commence their usual piping call note, one bird answering the other. Immediately they hear the sound of my pouring seed into their seed pot, and before they see it, the hen bird, which is a terrible shrew, gives a loud warning, intimidating, harsh call, intending to cow her spouse, whilst he utters a fainter responsive cry which seems to say—‘Well, my dear, I only want a share, and there is enough for both of us.’ When the hen bird has picked out the largest seeds and he has secured what he can, he feeds her from his crop, and they each alternately pass food from one to the other over and over again, whilst uttering very faint calls all the time. When I hold their pot of seed in my hand just outside the open cage door the birds, anxious to get at it, and yet at first too timid to venture outside, utter a curious and very quiet sound. ‘Crook-crook’ it sounds like, and this call I have not observed at any other time.

When preparing to roost the birds fidget about for a long time whilst choosing night perches, and all the time they twitter in an anxious manner quite different from the ordinary. When finally settled, should one bird become fidgetty again and disturb another on its perch, the latter in resenting this will call ‘Chee-chee, chee-chee,’ in a loud voice, sounds which the bird makes at no other time.

Here, perhaps, I may digress to speak of the remarkable difference in the actions of birds when disturbed in the night as compared with their conduct when disturbed in the daytime. In daylight the least alarm causes them to flutter or seek safety in flight, whilst in the darkness of night they remain perfectly quiet and still. This habit is rather akin to feigning death, which is so common in insects, spiders, etc., when alarmed.

It is not easy to say to what extent these many and varied vocal expressions of the emotions have unconsciously helped to build up the songs of some species, but I think we may say that, as a general rule, the complete song is a performance as distinct from the other different sounds uttered by birds as is the every day talk of men from the songs that some men may sing in their leisure hours or happy moments. And it must be evident to all who have listened for a moment to the steady, measured, leisurely song of the Blackbird or Thrush, that, whatever feelings the birds may then be expressing, they have nothing in any way akin to the rapidly-uttered harsh notes which seem to be *thrown at us* when we disturb their business or pleasure. On the other hand, certain call notes, notably the long drawn out 'Cree' of the Greenfinch, are apparently inseparable from the bird's complete song; but this is the exception, not the rule.

The song par excellence is that apparently joyous vocal performance of the male bird, which is generally given in a more or less leisurely or methodical manner, usually when the singer is settled and at ease. It has been described as 'an unbidden expression of emotional energy. It is most marked at the height of sexual emotion during the breeding season, but is not exclusively connected with this period.'

The bird's song proper varies immensely in the different species of birds, although, doubtless, each singer at its own time makes a special effort to produce a song of some sort.

We are probably right in supposing that the simple efforts of the cock Sparrow to make a continuous song of his 'Chee, chow, churr—chow, chee, churr,' produce the same effect upon the mate of his choice, or his rivals of the house roof, as do the rapturous strains of the Nightingale or Thrush. The Sparrow does his best, and he does as well as many other song birds, the Chiffchaff for example, to whom all ornithologists extend so warm a welcome in spring, not for the beauty of the bird or song, but merely on account of his visiting us before any other song-bird, and announcing himself so familiarly from our leafless trees.

Soft and simple lisping songs, suggestive of happy child life, characterise the vocal efforts of the Willow Wren, White-throat, Wheatear, Whinchat, and others. The Chaffinch sings a light-hearted, joyous, loud, rapid, though *short* song. The Robin is calm, plaintive, and almost sad. It sometimes in its confident familiarity enters a church, and then its voice has

more solemnity than the organ or the choir. I heard one singing in Scarborough Market Hall on one Christmas Eve. The Swallow softly twitters. The song Thrush's notes are gay, varied, and plentiful, though many of them are very squeaking. In *its* song, too, set phrases are frequently repeated. The Blackbird delights us all with his rich flute-like notes, sung in slow time and with accomplished manner. The Blackcap gives us the sounds of bubbling waters. The Nightingale's song exceeds all in variety, sweetness, and power. To my mind no poet has exaggerated its abilities. The Grasshopper Warbler imitates a faint pea whistle, and seems to have the power of continuing the sound for an indefinite time, and the same may be said of the Nightjar's mimicry of the sound of a threshing machine. The Cuckoo's voice is almost human. The Great Titmouse reminds us of a joiner sawing a plank. Groans, grunts, snorts, and snores, with sounds like weeping, wailing, and gnashing of teeth, come up the cliffs of Speeton from the nesting haunts of the Puffin, Razorbill, Guillemot, and Kittiwake. Demoniactal laughs from the Herring and Black-backed Gulls. Weird and unearthly shrieks, as well as deep and solemn hooting, characterise the voices of Owls.

Birds as musicians are not merely vocalists. The Snipe produces a wonderful bleating or buzzing sound in its downward flight from a great height.

The Nightjar by wing-clapping, and the Woodpeckers by drumming on a hollow tree, express their emotions, especially in the season of love or lust.

And if the varied *sounds* seem endless, the manners of the singers are almost equally so. Many birds besides the Skylark love to sing on the wing. The Dipper sits on a stone in the babbling brook, and there in mid-winter warbles sweetly, though in spring he chases his loved one up and down stream and sings *at* her most alarmingly.

The Sparrow and the Starling sing as happily on the house roof as in tree or bush. High trees are the favourite resort of the Missel Thrush. Many little birds, including the Sedge Warbler, rarely rise above the lowest bushes. Hundreds of Sparrows or Starlings often join in forming a general chorus in a tall tree, on a building, or the ground. On a certain church walls sometimes the chorus seems to continue all day, the place of birds leaving the ivy being immediately occupied by new comers. Several species, including the Pied Wagtail, sing

whilst perched on the ground, and also on the ground we may hear the chorus of the irrepressible Starling.

Giving mere figures, I may say that I have heard 37 species singing in trees, 32 in bushes and hedges, 17 singing whilst flying, 6 on buildings, 6 on the ground, 5 on telegraph wires, 1 (the Little Grebe) on the water, and 6 species indulge in chorus singing.

Birds vary very much in the amount of time which they give up to song—some singing only for a few seconds, and then resting perhaps for hours; others singing almost all day long, with intervals of minutes or seconds only, and with frequent outbursts during the night. Some must have perfect weather, others are utterly indifferent to weather conditions. Some sing for nine months of the year, others for three months only. Some (notably the Nightingale) become silent as soon as the young are hatched, others go on singing until the autumn moult, whilst a few others are not hushed by even this most trying time for birds.

Bright spring days are most favoured by birds; hot sultry days few like; a gale of wind is disliked by all. Weeks before the spring season of song commences, and indeed all through the winter, we may hear every day in our streets the songs of two birds who, despising alike cold damp fogs, drizzling rain, sleet or snow, or keen sharp frosts, cheer us with their daily voices. When men who are well fed, well clothed, and well housed, and with nothing to trouble them in any way, grumble incessantly at the weather conditions of their native country, it is to me indescribably delightful to see the penniless Starling, clothed only by Nature, and who literally knows not where the next meal will come from, perch upon a dirty human house roof, and, with wings moving to time, sing his song of apparently endless variety, and this in wind or rain, or winter snow. Under these same uninviting conditions the Robin also sings all through these dreary days. The songs of these and other birds have helped me more than the psalms of men.

But I always like to feel that the real season of song opens with the first bright days of January, and is heralded by the Missel Thrush, the bird which some modern systematists place first in the list of British birds. If the season be normal, when the dark days of December are past, January brings us brighter, if colder, weather. Then, however low the temperature may be, sunshine starts the Missel Thrush, who sings a loud and most exhilarating song, usually from the top of some tall tree.

The bird tells us very little in a song somewhat resembling that of the Blackbird, but, after the cheerless days of December, it is always doubly welcome. Once, when we had a few very bright days about Christmas, I heard the bird singing in December, but this was most exceptional.

About the same time in January the Song Thrush or Throstle may also be heard pouring forth his more artistic melody, usually from a tree branch, though not so invariably high perched as the Missel Thrush.

The Blackbird rarely commences singing before February, but I have heard him on 31st January. Of deeper tone, and really more musical though less varied, than the song of the Thrush, the Blackbird's voice is full and rich, and the song is sung in slower time than most other birds.

Before January is out we shall almost certainly hear that most modest of birds the Hedge Sparrow, whose rather quiet, though cheerful, simple ditty may be heard in a hedge or garden bush, though not unfrequently under the demoralising influence of civilisation he *descends* from a hedge to a house roof.

The Skylark, who has made feeble demonstrations of song all through the winter, now bursts out in all the fulness and variety of song for which he is so deservedly appreciated. His earlier weak attempts, accompanied by a very unambitious hovering in air, now give place to a long-sustained upward and spiral soaring flight, which carries the singer up and up almost out of sight before he finally, and seemingly reluctantly, descends again to man's estate. He is indeed a miserable Englishman who knows not the song of the Lark.

And in January, too, when the dog's mercury tries to raise its heavy head, we may hear the first soft coo of the Ring Dove, Hoo-hoo-hoo-hoo-hoo, 'Tak *two* coos *Jamie*,' sung from some big tree branch, though the bird has not yet so given himself up to love-making that he roosts with his mate instead of a hundred in a flock.

The song of the Stock Dove, less well known, is a simple disyllable, Hoo-wook, hoo-wook, and very dove-like. Coming home from our afternoon walk before the early sun has set we may now also hear the deep hoot of the Tawny Owl.

When February brings *still brighter* days we shall find that most of the January singers have improved their voices in both strength and quality. There is an increasing amount of food about now, and an ever-increasing number of hours daily in which it can be obtained, and this allows more and more time

for love-making and for fighting. Two quite different passions you would think, but I fancy not so disconnected as we generally suppose. We find that there is a lot of human nature in birds. So as spring advances we note that the bird song is often accompanied by strong coercive movements on the part of the cock, especially if his chosen spouse won't take the hints he gives of nest-building by carrying to her bits of grass, moss, etc.

Now, in February, the Wren literally *bursts out*, seeming to *throw* his song at us. Apparently disgusted by the slow musical time favoured by others, this tiny bird rushes out his notes at such terrific speed that it is quite impossible to attempt any sort of word representation of the performance.

By the middle of the second month the Yellowhammer will commence his part in the opera by demanding 'a little bit of bread and no cheese,' or as my Scotch friends render it, 'Deil, deil, deil, deil *tak ye*.' Singing in moderate time, but very frequently forgetting the last syllables, in a way very peculiar to the Yellowhammer.

About this time also the Corn Bunting commences to sing his feeble and monotonous ditty. Then the joyous Chaffinch comes on the scene, a handsome coxcomb who charms us with his loud and rapid song as he thus addresses his lady-love—Quick-quick-quick-quick do come and kiss me pretty little *dee-ar*. Now, at the time when the Chaffinch commences singing, he again begins to use a special call note which we rarely or never hear but in spring time. His ringing call, 'Chink-chink,' we may hear in autumn or winter, but now, in a rather love-sick sort of way he calls Weet—weet—weet, with the occasional addition ting-ting; thus:—*Weet*, ting-ting, and from the call 'weet' perhaps the bird derives its local name 'weety.' This special call is said to be most frequently uttered on dull days or before rain. I *have* heard it during heavy rain, but it is strange that one only hears it during those months that are usually the driest and brightest.

Now little parties of Linnets, that seem always to be in a hurry, fly over the fields, chattering together like children going to school. A sweet, delicate little song of considerable variety, which seems intended to keep the little flocks together, but presently, when these flocks dissolve into pairs, the cock Linnet will sing much louder, especially if the hen bird seems indifferent to his efforts and the charming rosy tints which now appear on his head and breast.

For some time I was not quite sure I should include the Titmouse family in my list of singing birds, for I had doubts as to whether some of their notes were songs or merely sociable calls. Certain it is, however, that whether songs or calls they become more loud and frequent in the spring time of song. Thus, in January, the Great Titmouse, which has only called 'Chink' like a Chaffinch during the autumn, only occasionally saying 'Ping-chur' in a feeble manner and at rare intervals, when February comes in repeats the 'Ping-chur' several times in succession, and now we have no doubt that it is a song. In January it was a single call or single link in the chain of song. Now in February we have the full song, which consists only of the same note several times repeated. The link has grown into a chain. The Coal Titmouse, which in appearance is a miniature of the Great Titmouse, now sings in miniature the Great Tit's song. The Blue Titmouse has been calling 'Chin-chin-chiddr' for months, but it now gives us a new note '*Chirr-ee-chi-chi*,' which doubtless is intended for a song. In the study of bird song the Titmouses are somewhat puzzling. None of them seem ever actually silent. They are exceedingly sociable, their notes vary very much, and I really fancy that they mimic each other's calls to some extent.

The Titmouses are tiny indeed, but not so small as the Golden-crested Wren, which is our smallest bird. There is no difficulty in distinguishing this bird's rapid and continuous *song* from the mouse-like *squeak* which it constantly repeats when flitting about in the fir trees with its restless brethren. In February, if our hearing is sufficiently delicate, we first hear it 'Chick-a-wee chick-a-wee chick-a-wee chur,' but it is not everyone who *can* hear the bird at all, the song is often so faint.

In March the bird orchestra is augmented by a few more species of birds, and we notice day by day that the individual singers become more and more numerous, their songs more full and complete, and of course the longer days give us more and more hours of music.

In March we first hear the Greenfinch, a song-bird very much under-rated. In its notes and general performance the bird somewhat resembles the Linnet, but it is superior to the Linnet in the variety of its notes, which are low, sweet, and never harsh. Since keeping a pair in confinement, I have been surprised at the cock bird's vocal powers. A long-sustained 'Cree-e-e' is always a part of this bird's song, and, if we hear it at some distance, this note will be the only one to catch the ear, just as

we hear the drum only in a distant band. I fancy that many birds that we now think *call only* may sing so quietly that we can only, so to say, catch the sound of the drum.

March also persuades the Meadow Pipit to soar feebly into the air and give us its feeble 'Peep-peep-peep-peep' of a song. The Lapwings, which have flocked in the fields hitherto, now settle down in their nesting haunts and sing 'Cut-a-cooeey, queeter, queeter, coee.' The Pied Wagtails now come in small parties; these separate into pairs, and the males sing *sometimes*, but though the birds are common enough we rarely hear them.

All our resident birds are now in song, and we daily expect the earliest of our visitors from the Continent. The Chiffchaff is usually first, singing its monotonous song—repetition of its own name, but it thrills the heart of the naturalist who once again hears its familiar notes.

The Wheatear at the end of March and the Whinchat in April sing from a railing or stone wall little songs that seem to come from a long distance.

Now on the wild moors the Ring Ouzel roughly imitates his nearest kin the Blackbird.

April brings the well-known Cuckoo, and also the Redstart, whose song somewhat resembles that of the Robin. Now the Swallow calls 'Chissick' as it flies round the barn, on the roof of which its twittering song is heard by the early-rising farmer.

Few spring visitors delighted me more than the Willow Wren, whose arrival takes place in April.

In mid-winter the Robins seemed to possess the groves. In February the song of the Chaffinch drowned that of the Robin. Now, the merry Willow Wren, one of the tiniest of birds, sings so loudly, sweetly, and incessantly that sometimes we seem to hear nothing but *it*. Singing in the upper branches of trees and being more generally distributed than most other summer visitors, we hear it daily in the parks of our town. But we must go to the deeper woods to hear the Wood Wren, who comes rather later, and with quivering wings sings in the higher trees a pretty melody ending in a shivering trill.

This bird also has a very plaintive call note, which it constantly repeats in the season of song. Where the Wood Wren sings we may also hear the rarer Pied Flycatcher, whose song is somewhat Redstart-like.

April also brings the Sedge Warbler to hedgerows and banks of rough herbage, where it skulks and sings aggressively

at us one of the most varied of all little bird songs, and sings it all day and night.

In similar haunts the Grasshopper Warbler, also just arrived, daily and nightly imitates the noise produced by a great green Grasshopper, singing by choice in the evening gloom.

The Tree Pipit rises from a tree top and sings as it mounts into the air, and then slowly descends with spread wings and tail a song far superior to that of the Meadow Pipit, who sometimes imitates its habits.

By the end of April the Corn Crake is calling in the meadows; the Sandpiper 'chants a joyous song' 'along the river's stony marge,' as Wordsworth says. The Curlew's weird whistling song is heard a mile away on the heathery moors, where from a boggy hollow the Snipe rises in air and descends drumming.

In the merry month of May the hedge-haunting Whitethroat flits up a few yards into the air and sings 'Chew *wit* chi, chi, chi *witchy* chew' before it drops into the hedge again. And we may also now hear in similar haunts the Lesser Whitethroat, whose song reminds us of the Chaffinch, though a long way off. Deep in the woods the Blackcap's voice sounds full and rich, and the Garden Warbler's voice, not much inferior to the Blackcap's, may be heard in similar haunts.

Some birds sing most frequently when flying, and in this respect none is more noticeable than the Lesser Redpoll, who now returns to us in little parties, flitting over the tree-tops, singing 'Chichi-chichi-burr.' This is our smallest Finch, and the cock bird, with his crimson breast and crown and black throat, is a bonny little fellow. Summer brings us the Turtle Dove, whose purring voice, '*Porre, porre,*' we may now hear. Another late summer visitor is the Nightjar, whose curious vocal and instrumental sounds are best heard after nightfall, when most other voices are hushed.

June brings us no new voices. Indeed, now one by one the songs will begin to fall off. At the beginning of this month we may hear 30 or more different species singing during a day's walk, but when the longest day is here many birds will be heard before 3 a.m.; but the number of species will be reduced.

Family cares are responsible for this, and it is chiefly the *singing* birds that have to spend every hour of daylight in hunting food for the young and themselves. The cock birds are no doubt very good husbands, but when from five to seven children all come into the world at once, he would be a

questionably devoted bird benedict who sat on a tree branch singing, whilst his wife did all the worm winning.

So we find that before June is out the Missel Thrush and Starling, the Chaffinch and Redstart, are silent, the Song Thrush and Blackbird almost so. The Tom Tits are not singing, and the Cuckoo has changed his tune.

Before the end of July, although the Robin will again be freely singing the song that I have heard during every one of the last twelve months, we shall only get very occasional and feeble outbursts from any other of the warblers, and shall probably not hear a note from any of the Thrushes. The season of song is now over.

But in the dog days and till the end of August we shall daily hear the merry twittering of the Martin and Swallow, the long-drawn 'Cree' of the Greenfinch, whilst the Linnet, the Redpoll, the Corn and Yellow Buntings, will sing through the month. The Ringdove will still coo in the woods, and the Starling again come back to the town house-roof and join with the Robin in song that will continue all winter.

September makes little difference in the number of singers, and then, strange to say, two of our summer visitors, the Chiffchaff and the Willow Wren, will occasionally indulge in a feeble repetition of the songs they sang so gaily in May.

The following figures give the number of different birds that I have heard singing in the Scarborough district during each month of one year:—January, 10; February, 15; March, 21; April, 28; May, 39; June, 36; July, 29; August, 18; September, 13; October, 10; November, 7; December, 8.

The early morning singing of the birds is heralded by the Skylark at 1.51 a.m. on the 21st June. The evening chorus then concludes with the song of the Thrush, which I have heard as late as 9.15.

REPTILES.

Cape Tarentola at Huddersfield.—Two specimens of this Lizard (*Tarentola capensis*) were captured early in March in our wholesale market, being found amongst bananas imported from the Canary Isles. Both were brought home by a youth in our village and placed in a warm greenhouse, but owing to lack of proper food they died within a few days.—W. E. L. WATTAM, Newsome.

FIELD NOTES.

MAMMALS AND BIRDS.

Gamekeeper's Hoard near Scarborough.—The largest I have ever seen is at Irton, near Scarborough, erected at the edge of a close-set plantation of Spruce. About 12 yards long and three yards high, its several upright posts support four horizontal battens to which the specimens are nailed. In 1890 the exhibits were as follows:—4 Sparrow Hawks, 2 Kestrels, 20 Long-eared Owls, 4 Short-eared Owls, 7 Tawny Owls, 2 Barn Owls, 2 Magpies, 1 Jay, 17 Carrion Crows, 354 Weasels, 146 Stoats, 36 Hedgehogs, 100 Cats' tails, about 100 Rats' tails, besides a great quantity of remains beyond identification. On 4th March of this year the rack displayed 4 Kestrels, 1 Sparrow Hawk, 2 Carrion Crows, 2 Hooded Crows, 2 Jays, 130 Stoats (3 being in white winter fur), 110 Weazels, 31 Cats' tails, 380 Rats' tails, and upon an auxiliary rack close by, apparently erected for this exhibit only, about 1,500 additional Rats' tails. Ornithologists will note with pleasure the entire absence of Owls from this year's list which, compared with that made 15 years ago, indicates notable changes either in the methods of local gamekeepers or the comparative scarcity or abundance of the various so-called vermin. Speaking of the birds only, I think there is neither increase nor diminution in their numbers here, except in the case of the Short-eared Owl, a winter visitor whose numbers vary greatly.—W. GYNGELL, Scarborough.

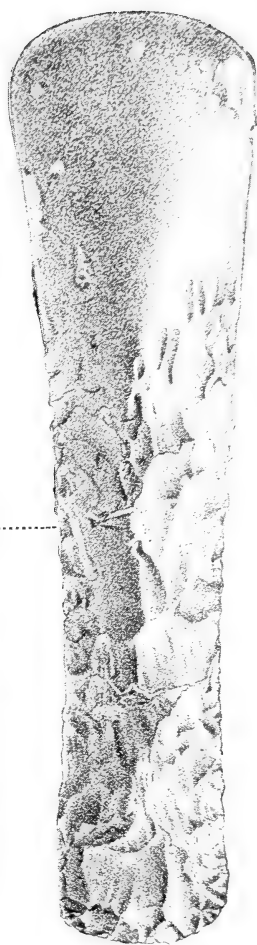
COLEOPTERA.

Wintering Habits of the 7-Spot Lady-bird.—I was much interested in the note under the above heading in the March 'Naturalist,' having myself found a colony of some hundreds of this insect in a semi-dormant condition in furze bushes growing close to the summit of Oliver's Mount, Scarborough, on 26th December last. This hill rises 500 feet above sea level, and the furze bushes referred to are at the top of the steep northern slope. The insects had chiefly packed themselves in and around the leaf axils, but numbers were also found inside the rolled-up dead leaves of the beech trees, scattered upon and beneath the furze bushes. These Lady-birds have been abundant and noticeable all about this district during this winter, and though inactive their hibernation has certainly been very incomplete.—W. GYNGELL, Scarborough.





A. $\frac{3}{4}$



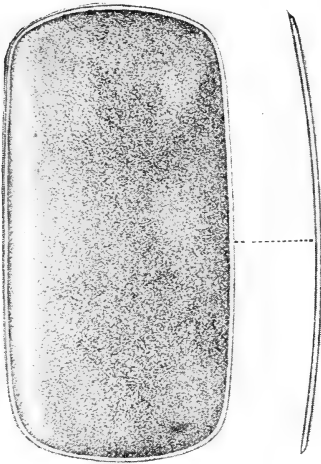
B. $\frac{1}{2}$



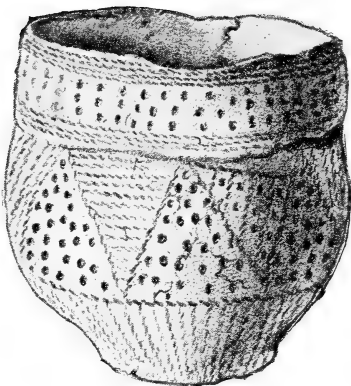
C.

Pre-Historic Remains from East Yorkshire.

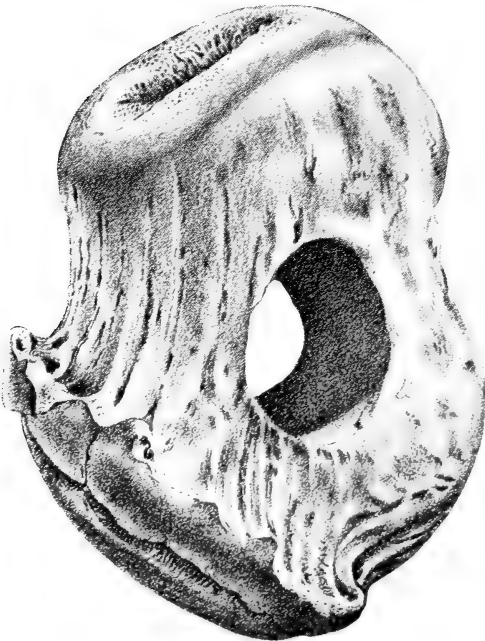




D. $\frac{1}{1}$



E. $\frac{1}{3}$



F. $\frac{1}{1}$



G. $\frac{1}{1}$

PRE-HISTORIC REMAINS IN EAST YORKSHIRE.

FOR some time the interest in evidences of the pre-historic occupants of these islands has been manifest, and as years go on, more and more attention is devoted to the study of the past. The time has now gone when arrow points were looked upon as fairy darts, and stone axes as thunderbolts. Researches into the manners and customs of recent and modern savage and semi-savage tribes have resulted in many analogies being drawn between present-day practices and those in vogue 2,000 or more years ago.

In this country there have been many workers who have considerably added to our knowledge of the pre-Roman occupants. Some authors have devoted special attention to certain phases of art of the ancient Britons or to other similarly definite subjects. Our principal knowledge of the Britons, however, depends upon the researches of those archæologists who have carefully excavated and examined the burial mounds of British chiefs. Therein lie the implements, weapons of war, ornaments, and earthenware vessels, which more than anything give us an idea of the mode of living of these people.

Thos. Bateman, in his 'Ten Years' Diggings,' so long ago as 1861, described the results of his excavations in a number of tumuli in Yorkshire and Derbyshire, etc. Other districts were dealt with by Sir R. Colt Hoare, Mr. Warne, and Mr. W. C. Borlase. Later, Canon Greenwell, in 1877, produced his classical 'British Barrows,' in which a general résumé of our knowledge up to that time of the contents of British tumuli in general, and those of North-East Yorkshire in particular, was given. Later still, the well-known and lavishly-illustrated volumes by Major-General Pitt-Rivers appeared.

We now have the pleasure of recording the appearance of a book, which for excellence of illustration, for care as regards the accuracy and details of the excavations it records, has not been excelled, and, in view of the fact that so few British unopened tumuli exist in the country, the probability is that no work of the kind will ever again be produced.

In 'Forty Years' Researches in the British and Anglo-Saxon Burial Mounds of East Yorkshire'* Mr. J. R. Mortimer has just produced the results of his life's work as an antiquary. Situated in what has proved to be a district of exceptional antiquarian

* A. Brown & Sons, 5, Farringdon Avenue, E.C. Price 50s. net.

wealth, Mr. Mortimer has devoted his leisure time in the examination of the sepulchral monuments which dotted the landscape in the vicinity of the Yorkshire Wolds.

Mr. Mortimer has carefully examined all the evidences available in the southern portion of the Wolds ; the adjoining northern section of which has been systematically worked by Canon Greenwell. Some 300 barrows have been carefully opened and their contents examined and transferred to the Driffeld Museum by Mr. Mortimer or his late brother Robert.

A catalogue of the Museum, issued in 1900, contained an enumeration of the relics in the Museum collection. 'Forty Years' Researches,' however, contains details of the excavations of the barrows, as well as of Anglo-Saxon cemeteries, sites of Roman occupation, pre-historic trackways, earthworks, etc.

Unquestionably, the details of the barrow openings form the most substantial, and, at the same time, the most interesting part of the work, and the descriptions are enriched in value by plans and sections of the various barrows, showing the relative positions of the different interments, with the implements, ornaments, or vases buried with them. This feature is a new one in works of this kind, and its value cannot possibly be over-estimated. Whilst it occasionally happened that not only the skeleton but the entire suite of objects buried with it had entirely decayed, still the rule was that earthenware vessels, or other objects were found in association with the skeletons. These were frequently in a very decayed and fragmentary condition, but Mr. Mortimer has restored them in a way which could only have been accomplished by a man of extreme ability and patience.

As a result of his labours the Driffeld Museum contains one of the finest collections in existence of British food vases, cinerary urns, drinking cups, and incense cups, weapons and implements of bronze, iron, stone, bone, horn, jet, and other materials. Fortunately, in Miss Agnes Mortimer, the author possesses an artist of exceptional ability, who for many years devoted her time to making most faithful drawings of every object of importance in her father's collection. These drawings have been reproduced in the present work by the half-tone process, and the 125 plates, which are occupied by them, as well as the numerous illustrations in the text, form by no means the least valuable part of the work ; in fact, the collection of drawings alone enables the possessor of each book to have practically an archæological museum upon his shelves.

In addition to the description of the opening of the barrows, Mr. Mortimer has chapters dealing with Anglo-Saxon and Roman remains, 'British Chariots,' 'Ancient Entrenchments,' 'Ancient Hollow-ways,' 'Habitation Terraces,' 'Cultivation Terraces,' and 'Embankment Crosses.'

At the end of the work are some valuable and exceedingly carefully-compiled tables, giving details of the various barrows, their contained interments and associated remains. A perusal of these tables enables the antiquary to see precisely the proportions of implements or weapons found in any given group of barrows, and in this way the characteristics of the respective groups can be seen at a glance.

The work also contains a map in three colours, showing the positions of the barrows on the Wolds, the pre-historic earth-works which traverse the hills and dales in all directions, as well as other features of archæological interest.

Mr. T. Sheppard, the Curator of the Hull Museum, has seen the work through the press, prepared the Index, and given an 'Editorial' at the commencement of the work.

Unquestionably 'Forty Years' Researches' will be a standard work of reference for all time, and no educated Yorkshireman ought to be without it on his shelves. That it will have a large sale outside the county, and even abroad, is only what might be expected from the excellence of the information contained therein, the variety of objects treated, and the charming way in which the publishers have done their share of the work. We are permitted to reproduce some specimen illustrations on the accompanying plates, VI. and VII., particulars of which will appear next month.

NATURE STUDY CONFERENCE AT KEIGHLEY.

At the invitation of the Mayor of Keighley (Ald. John Smith), who, along with Ald. Brigg, has done so much to develop the Natural History Museum at Keighley, under the curatorship of Mr. S. L. Mosley, a large number of head teachers, together with members of Education Committees, Scientific Societies, Museum Curators, and others interested in Nature Study in schools, met at the Victoria Park Museum, Keighley, on Saturday, 25th March.

Here was an excellent exhibition of apparatus and school work, which, together with the rapidly-extending permanent

exhibits, provided much material of interest to the visitors. Later an adjournment was made to the Town Hall, where tea was provided, after which, under the presidency of the Mayor, three papers were read and discussed bearing on the various aspects of Nature Study in schools.

Mr. H. Mosley, of the Kirkheaton National School, dealt with 'Nature Study in Schools under present Conditions,' and he strongly advocated the development of this kind of work in schools, though to make the most of it teachers should not be too rigidly tied to time-tables. They needed, too, much help and guidance in the matter, and he had found Prof. Miall's recent book especially useful in preparing suitable lessons.

Mr. T. W. Woodhead, of Huddersfield, followed with a paper on 'Simple Methods of Nature Study.' He supposed that the object of introducing Nature Study and Object Lessons into schools was to train and develop the powers of observation of the child by the study of the things themselves; therefore object lessons without objects ought on no account to be permitted in schools. The teacher should endeavour to interest the child in plants and animals as living things, rather than as specimens, and he showed by a large number of interesting yet simple experiments the many important lessons to be drawn from the study of plants as living things. In this way, he said, lessons could be made real and instinct with life and interest. This means time and trouble, but when a good lesson has been prepared the most should be made of it and used for lessons in dictation, composition, drawing, etc. It is the duty of teachers to make the most of their opportunities, and it is equally the duty of Education Committees to support by every means in their power the efforts of their teachers. Nature Study has often been killed by apathy and want of sympathy on the part of some inspectors, who make the most of the want of knowledge on the part of the teachers, while the trouble involved to the teacher in obtaining objects renders this part of their work irksome, and many complain of the stinginess of local committees in not supplying materials; but he showed that expensive materials were not necessary to really good work. He agreed with Mr. Mosley that in this subject teachers need help and guidance, and that if it is to be worthy of a place in our school curriculum greater efforts will have to be made in this direction.

When the subject is treated aright it cannot fail to show how full of life and interest everything around us is, and that life itself is dependent on a few interacting forces; that when

we trace it backwards we find that we ourselves owe our existence to the green stuff in the plants around, which, by utilising the carbon di-oxide of the air and the mineral salts of the soil, provide us with our every food directly or indirectly, and that even this substance is dependent on this dominating, all-important factor—light.

A third paper was by Mr. H. Crowther, Curator of the Leeds Museum, on "The Museum as a Teacher of Nature Study." He showed in a most interesting manner how the Museum in Leeds had been used for the benefit of both teachers and scholars, some 47,000 having attended lectures there during the last four years. He pointed out, however, that specimens in cases, however well labelled and arranged, were not sufficient in themselves; the special knowledge of the living thing possessed by the Curator or Naturalist was necessary to infuse real interest in the child.

After an interesting discussion, resolutions were adopted affirming that a knowledge of Nature should form a part of every child's education, and should be continued through the school life. It was also decided to recommend to the County Council the appointment of a carefully-selected, well qualified instructor as a helper in Nature Study for teachers.

MOLLUSCA.

***Sphærium pallidum* at Salterhebble.**—The Leeds Branch of the Conchological Society, at their meeting on 11th March 1905, at Salterhebble, added another locality to the few Yorkshire ones for *Sphærium pallidum*. This interesting species was found in the canal at the above place.—F. BOOTH, Saltaire.

REVIEWS AND BOOK NOTICES.

Records, Historical and Antiquarian, of Parishes Round Horn-castle. By J. Conway Walter. W. K. Morton, Horncastle. 245 + 13 pages. Price 5s. net.

In this work our frequent contributor, the Rector of Langton, brings together various notes, principally historical, which he has gathered together during peregrinations round his parish. The notes are arranged under the heads of the respective parishes, and can be thus readily referred to by anyone interested in any particular place. The book is written in a chatty style, and will well repay perusal by any student of history—the author not having neglected any record likely to be of value. The publishers have also done their share of the work creditably.

The author, who loves the county, has visited over 70 parishes—always on foot—and is strongly in favour of that method of progression which every reader of 'The Naturalist' will appreciate. He says: 'It is not, however, the cyclist, who rushes through our rural charms with head in the

position of a battering ram, and frame quivering with the vibration engendered of his vehicle, who can dwell on these attractions with full appreciation. Nor is it his more reckless brother, the motorist, who crashes along our country roads, with powers of observation narrowed by hideous binocular vizzor, and at a speed whose centrifugal force drives in terror every other wayfarer—chicken, child, woman, or man, to fly like sparks from anvil in all directions, if haply they may even so escape destruction.'

Annual Report and Proceedings of the Lancashire and Cheshire Entomological Society.—This old and well-known society is to be heartily congratulated on its 'Twenty-eighth Annual Report and Proceedings,' just issued. They show at once that the society, always a good one, is now in an exceptionally flourishing condition. Its record of the past year tells of solid and valuable work accomplished, whilst the scientific standing of its present officers should be a sufficient guarantee as to its future progress. Perhaps the most valuable parts of the 'Proceedings' are the 'Preliminary List of the Orthoptera of Lancashire and Cheshire,' by the Hon. Secretary, Mr. E. B. J. Sopp, F.E.S., and the paper on 'The Callipers of Earwigs,' by the same author. These are both worthy of a wider circulation than they are likely to get in the 'Annual Proceedings' of a local society. Very interesting also to the field lepidopterist is the annual address by the Vice-president, Mr. Robert Tait, jun., on 'A Lepidopterist's Work during 1904'; whilst we are sure that the most excellent portrait of the veteran President of the society, Mr. Samuel J. Capper, F.E.S., which forms the frontispiece, will, to the members, be not the least acceptable part of the 'Proceedings.'—G. T. P.

British Freshwater Algae.—In the review of the above work in the March 'Naturalist' the illustration of a 'slip' on the part of the author is really a 'slip' on the part of the reviewer. He says: . . . 'there are occasional slips, as when the filaments of *Sacheria* are stated to be 'little branched,' as opposed to those of *Lemanea*, which are described as 'very branched,' whilst the figures (Fig. 3, A and C) indicate the reverse.' This statement is quite untrue. Under the Family Lemnaceae (on p. 40) it is stated: 'The fructiferous branches . . . are the most conspicuous and important parts of the plant, in most species the vegetative portion dying away after their production, . . .'. Under *Lemanea* (p. 42): 'The vegetative thallus . . . is very branched but never piliferous. The fructiferous filaments are torulose and normally simple. Under *Sacheria* (p. 42): 'The vegetative thallus is . . . little branched, often piliferous, and exists for about a month. . . . The fructiferous filaments are cylindrical or setaceous and usually branched.' The vegetative thallus of these plants has only been seen by a few authors, and the filaments figured are naturally the fructiferous ones, which are the *most conspicuous and important parts of the plant*, reaching a length of 18 cms.—G. S. WEST.

Of books dealing with birds there appears to be no end. 'Birds I have Known,' by A. H. Beavan, is issued by Mr. T. Fisher Unwin (5s.). It is evidently intended as a prize for a good—very good—boy or girl—and will certainly not lead him or her astray by teaching anything about evolution or matters of that sort. The author informs us that he doesn't believe in transmigration of souls, nor in the theory that birds were at one time reptiles and have developed themselves into their present higher form of life.' He is content to accept the unquestioning creed of his little son, who maintains that, 'as the Bible says 'God on the fifth day created every winged fowl after their kind,' it is no use saying that he *didn't*.' Those of our readers who have little sons of that character should buy them Mr. Beavan's

book. It contains many anecdotes of birds, British and foreign. There are several illustrations, which are fair.

The same publishers have issued 'British Bird Life,' by W. Percival Westell (5s.), which is much more for the money. In this work the author appears to have put together every possible scrap of information he can find in reference to the 177 species of birds nesting in these islands, with description of the birds, their nests, food, etc., and now and again an anecdote thrown in. The author's own words perhaps best explain our views in regard to the book. He says, 'As a scientific contribution to the knowledge of the birds of our country my work may not be of any import-



Nest and Eggs of Lapwing.

ance; on the other hand, if its publication results in inculcating a love for birds amongst once indifferent observers, my task will not have been in vain.' The book consists of 340 closely-printed pages and has an Introduction by Herbert Maxwell. The birds are arranged in their alphabetical order, which appears to be somewhat incongruous. There are many illustrations from 'original drawings' by Arthur Martin and from photographs. The latter (one of which is reproduced herewith by the courtesy of the publishers) we much prefer.

NORTHERN NEWS.

Mr. J. E. Bedford, F.G.S., has been elected president of the Leeds Institute.

A Crab, measuring 2 feet 7 inches across, was found recently in a hole on Filey Brig.

Mr. F. H. Day contributes 'Notes on Cumberland Coleoptera in 1904' to the January 'Entomologists' Record.'

The Rev. T. A. Brode contributes 'Happy Hunting Grounds for Nature Students' to 'Nature Study' for March.

A pigmy Shrew is recorded near Scarborough, by Mr. W. J. Clarke, for the first time in the existence of the Scarborough Field Naturalists' Society.

Mons. E. Margier has an interesting note, 'Sur la *Pupa anglica*, type de la faune dite Lusitanienne,' in 'La Feuille Des Jeunes Naturalistes' for March.

A floating triangular breakwater, weighing seven tons, has been put on the shore at Hornsea, opposite the Marine Drive, in the hope of checking the inroads of the sea.

Mr. R. S. Bagnall has a note on '*Chrysomela orichalcia* Mull., var. *hobsoni* Steph., in the Northumberland and Durham District,' in the 'Entomologist's Record' for March.

In the February 'Geological Magazine' Mr. G. C. Crick describes a fragment of a Nantiloid, *Cyrtoceras (Meloceras) apicale*, from the Carboniferous Limestone of Kniveton, Derbyshire.

Mr. T. A. Coward has notes 'On some habits of Natterer's Bat' in the 'Zoologist' recently issued. These are based upon observations on a specimen sent from Barnsley (see 'The Naturalist,' Feb. 1905, p. 37-39).

'Goole and Thorne Moors' is the title of a paper by Mr. G. E. Bunker in 'Nature Study' for January. The same ground was covered by the writer's father, Mr. Thos. Bunker, in the 'Transactions of the Hull Scientific and Field Naturalists' Club' for 1898.

Mr. A. E. Gibbs contributes notes on the 'Lepidoptera of the Lincolnshire Coast [Theddlethorpe St. Helen]' to the March 'Entomologist.' The same journal contains the first part of 'A List of the 'Macro-Lepidoptera' of Lancashire and District' by Mr. C. H. Forsythe.

The paper on 'Coast Erosion' by Mr. A. E. Carey, and 'Erosion on the Holderness Coast of Yorkshire' by Mr. E. R. Matthews, with abstracts of the discussions upon the papers, have been reprinted from the 'Proceedings of the Institute of Civil Engineers,' and occupy over a hundred pages.

The 'Leek Post' for February 4th contains 'A List of Carboniferous Limestone Fossils (chiefly shells), recently arranged and enlarged. Presented to the Nicholson Institute by Sir Thomas Wardle, F.G.S.' It occupies over three columns, and enumerates 278 specimens. They are from the Carboniferous Limestone of North Staffordshire.

The herbarium recently purchased from Dr. F. A. Lees by the Bradford Corporation contains from 15,000 to 20,000 specimens, only one species in the British flora (*Epipogon aphyllum*) being wanting. The botanical library, also purchased, includes over 200 'Floras' and 'Catalogues' of local areas. The price paid for the plants and books was £150.

The excursions of the Yorkshire Naturalists' Union for 1905 are as under:—

May 6th.—Ripon.

June 10th-12th (Whit week-end).—Leyburn.

July 8th.—Loftus.

August 5th-7th (Bank Holiday week-end).—Pocklington.

September 9th.—Cudworth.

September 22nd-28th.—Fungus Foray. Roche Abbey and Maltby Woods.

We regret to record the death of the Rev. F. O. Pickard-Cambridge, who has done so much in furtherance of the study of the arachnidæ. Many of our readers are indebted to him for valuable assistance. His interest in spiders commenced when he was a boy, and at the time of his death he was unquestionably the leading authority on the subject. In 1904 he completed a Monograph of the Central American Spiders. He has left unfinished the county records he was preparing for the 'Victoria History,' and also his revision of the generic nomenclature of spiders. It is considered that overwork was the primary cause of his death. He was 44 years of age.

2 MAY. 1905

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THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL OF

NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

T. SHEPPARD, F.G.S., and T. W. WOODHEAD, F.L.S.,

MUSEUM, HULL;

TECHNICAL COLLEGE, HUDDERSFIELD;

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

J. GILBERT BAKER, F.R.S., F.L.S.,

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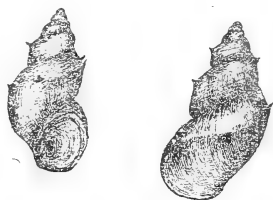
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NOTES AND COMMENTS.

VARIETY OF *PALUDESTRINA JENKINSI*.

In the recently-issued 'Journal of Malacology,'* Mr. H. Overton describes a variety of *Paludestrina jenkinsi*, to which he gives the name *aculeata* var. nov. It was collected along with others of the keeled form, from the canal at Muckley Corner, near Wall, Staffordshire. As will be seen from the



Paludestrina jenkinsi var. *aculeata*.

figure, kindly lent to us by the editor of the journal, there is a number of minute spikes irregularly distributed around the keel of the different whorls. In other respects the shell is typical. We should be glad to hear of records of this variety elsewhere.

MOLLUSCAN MIXES.

In the 18 pages comprising the same issue of the 'Journal of Malacology,' 15 are occupied by four articles describing no fewer than 49 new species of shells and one new variety. Then follows a note drawing attention to the fact that 'Several pre-occupied generic names have lately been proposed,' etc. ! In the description of one 'new species,' rejoicing in the name of *Diplommatina* (*Nicida*) *delectabilis*, reference to a Fig. 41, Plate ii., is given, though we cannot find Fig. 41 on any of the plates in the publication. Judging from the length and nature of some of those proposed, it would almost appear that our conchological friends are experiencing difficulty in finding new names, e.g., *cyrtochila*, *serendibensis*, *gaylordæ*, *brunneolineata*, *brunneoflavida*, *purpureoapicta*, *suavissima*, and, *exasperata* ! Another conchological publication, 'The Nautilus,' for the same month as the above-mentioned journal, contains 12 pages, which include the following items:—New species of *Viviparidæ* and *Unionidæ* from Florida, A new species of *Medionidus*, A new

* Vol. XII., No. 1, 1905.

species of *Somatogyrus* from Alabama, and New species of *Lymnæa*. Strangely enough, these papers are immediately followed by three short notes. The first points out that the name for a new genus (*Aporema*) had previously been used for an insect. A new name is therefore suggested—*Panacca*. Similarly, the name *Trichodina*, proposed for a land shell, was used in 1830 for a genus of Foraminifera! The Molluscan genus is therefore changed to *Petriolu*. The third correction refers to a recent description of 'a shell supposed to be that of a slug, under the name *Vaucheria tingitana*.' Fresh specimens have recently been received, however, which prove 'to be plates (the tergum) of *Pollicipes cornucopia*, a stalked barnacle of European seas. The supposed new genus therefore becomes a synonym of the Cirrhipede'! We are afraid that some of our conchologists (who are by no means alone in this respect) are in too great a hurry to publish the results of their *researches*. There ought to be a sort of Naturalists' 'black list,' upon which the names of all offenders should be placed and circulated! We pity the compiler of a future 'Index Animalium.'

THE PACIFIC EIDER IN BRITAIN.

The story of the occurrence in Britain of the Pacific Eider, as told by Mr. C. Oldham,* is an interesting one. It will be remembered that a few months ago a Pacific Eider was recorded in the principal natural history journals as shot at Scarborough. It appears that an Oldham naturalist 'received a drake Eider in the flesh from a Scarborough dealer. The black chevron on the chin at once suggested that the bird was not a Common Eider.' On communicating with the Scarborough dealer for further particulars the latter replied 'that the Eider had been consigned to him in the ordinary course of trade by an Orkney wild-fowler—whose name was withheld—and was forwarded to Oldham within half an hour of its arrival in Scarborough, without having undergone a scrutiny which might have revealed its identity. Inquiries made at Orkney . . . have elicited the information that the bird was shot out of a flock at Graemsay by a wild-fowler named George Sutherland.' There is sufficient evidence, however, to establish the bird as a British specimen, and the Oldham naturalist has evidently got a good bargain. It is strange that the bird should have reached the Orkneys—a place so far remote from its known habitat, the Behring Sea.

* Mem. and Proc. Manchester Lit. and Phil. Soc., Vol. 49, Part 2.

THE SCARBOROUGH MUSEUM.

Penny guide books to museums are now becoming much more frequent, and unquestionably do much to popularise such institutions. Formerly guide books to an average museum were sold at eighteen pence or half a crown—and were then very ‘dry,’ and their sale was not great. The Scarborough Museum is the most recent to produce a penny hand-book, which is edited by Dr. J. Irving. It consists of sixteen pages, and contains a chatty description of the more interesting geological, natural history and archaeological contents of the building. Special reference is given to such objects of particular value that the Scarborough Literary and Philosophical Society possesses. In perusing the handbook, however, it is apparent that even yet the museum requires a vigorous overhauling and rearrangement. The way that antiquities, geological specimens, and birds occur side by side with South Sea Island clubs, etc., savours of a ‘classification’ of half a century ago. We believe the Scarborough Naturalists’ Society is helping in the desired direction, but probably the work of the museum is carried on as well as funds will allow. We must hope for better times. Till then, every care should be taken of such objects that are already in the charge of the society, and towards this end we would strongly recommend that some of the objects now in the garden—exposed to rain and frost and snow—should be put under cover.

THE BRADFORD MUSEUM.

At a recent meeting of the Free Libraries, Art Gallery, and Museums Committee of the Bradford Corporation, a definite step was taken towards the formation of a natural history collection at the Cartwright Memorial Hall. It was decided that a large room at the west end of the ground floor, with the adjoining small room, should be utilised for the accommodation of a natural history collection, on lines suggested in a memorandum drawn up by the Council of the Bradford Scientific Association, and submitted to the Committee by Mr. S. Margerison and Mr. Naylor. It was further agreed that the collection should be as far as possible confined to the natural history of Yorkshire, although the Committee reserve to themselves the freedom to consider on their merits any other suggestions which may at any time be made, and also to accept, if thought desirable, any objects or specimens offered to them not of Yorkshire origin. It is pleasing to note that,

after all, natural history is not to be neglected at the Cartwright Hall, and it is very encouraging to find that the Corporation Committee is taking advantage of the advice offered by the naturalists of Bradford.

BATS.

Interesting though Bats are, they seem to be strangely neglected by naturalists, and it is only rarely that much attention is paid to them. It has recently been shown in this journal* that in one Yorkshire locality seven out of the eight species recorded for the county have been observed. In the Memoirs of the Manchester Literary and Philosophical Society just issued†, Mr. Chas. Oldham contributes a valuable paper 'On some habits of Bats, with special reference to the Lesser Horseshoe Bat (*Rhinolophus hipposiderus*).' In this the author gives the results of his observations of the habits of various Bats which he found in disused copper-mines at Alderley Edge, in the Cefn Cave, and other localities. Mr. Oldham draws attention to many errors in connection with the habits of Bats which occur again and again in 'popular' text-books, and even frequently in more serious treatises on the mammalia. The paper is illustrated by four photographs taken by Mr. R. Newstead, which we are kindly permitted to reproduce (Plate XI.). Fig. 1 shows the Lesser Horseshoe Bat in repose, ventral aspect; Fig. 2 the same, dorsal aspect; Fig. 3 Leisler's Bat in repose, dorsal aspect; and Fig. 4 the Long-Eared Bat walking.

MODERN SCIENCE AND MODERN THOUGHTS.

In the recent issue of a contemporary a Fellow of the Royal Society asks for information in reference to the Whitby Museum. We hope that the answer which has been supplied will be satisfactory to him. It is about the finest example of absolute 'rot' that we have had the pleasure of reading. We learn that the museum contains 'a splendid and valuable collection of fossils, minerals, shells, birds, insects, and other specimens in natural history, likewise in coins, antiquaries [!], books on science, etc. . . . Strangers can inspect the museum on payment of one shilling each . . . and they will be well repaid. . . . The aluminous schistus [sic] abounds with petrifications, particularly bones and testaceous substances. . . . Besides those belonging to amphibia of the genus *Iacerta*, many others are

* Feb. 1905, pp. 37-39.

† Vol. 49, pt. 2, 1905.



Fig. 1.

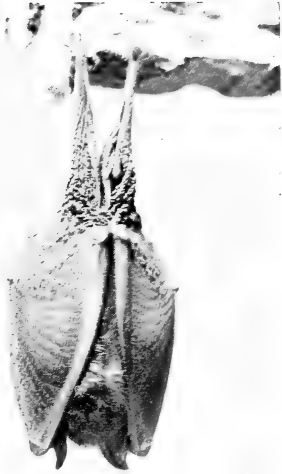


Fig. 2.



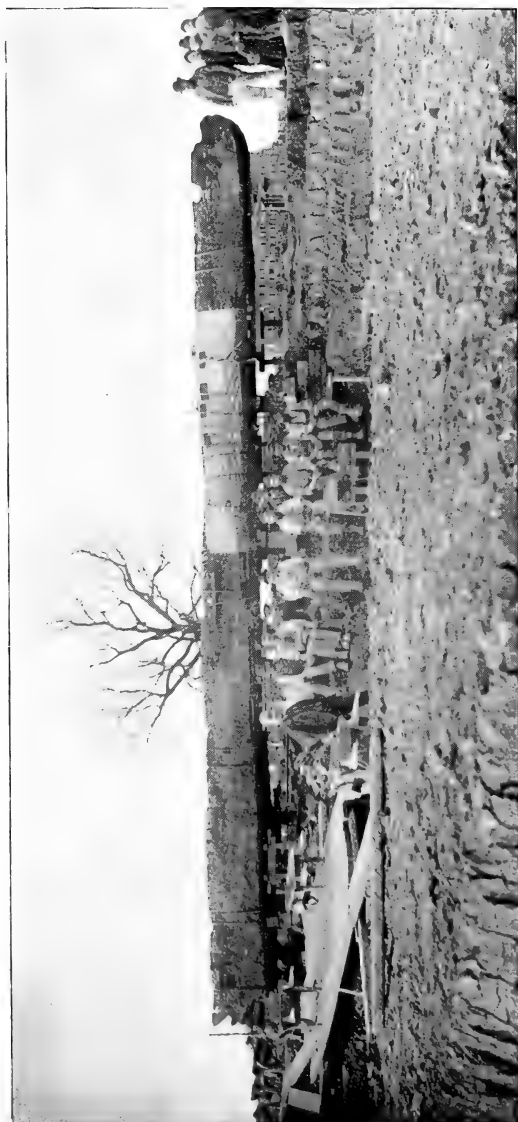
Fig. 3.



Fig. 4.

Some British Bats.





British Boat found at Brigg, Lincolnshire.

found which may be assigned to the squalus, or shark family, particularly portions of the spine. . . . According to some accounts skeletons of horses, and even skeletons of men, have been discovered; but we cannot venture to assert that genuine human remains exist in our alum rock. Among the testaceous petrifications in the aluminous schistus, the nautilite, the ammonite, and the ammonides held a distinguished place, particularly the ammonite, or cornu ammonis.' After that, we must agree with the concluding sentence:—'Now it will be seen that the Whitby Museum being in close proximity to such a fertile district, must be richly supplied with specimens of the most interesting character.'

THE BRITISH BOAT AT BRIGG.

There have been many interesting relics of the past found at Brigg, in Lincolnshire, probably the most important being the pre-historic boat figured on Plate XII. It is a 'dug-out,' made from a single oak trunk of gigantic proportions. An idea of its size may be gathered from a comparison with the figures shown in the photograph. Another object found was an ingeniously-constructed flat-bottomed boat, said to be forty feet in length, and averaging six feet in width. Still another relic, of undoubted great antiquity, was the wooden roadway or 'causey' made of squared planks of oak, fastened into position with clinch-pins of wood, which was excavated in 1884. The above-mentioned objects, together with others of more recent date, are figured and described in a pamphlet* recently issued by the Rev. A. N. Claye, who has kindly favoured us with the loan of the block. We doubt, however, whether the author is correct in his assumption that the causeway is the 'most ancient relic of the past in Brigg.' We are inclined to give that distinction to the 'dug-out' boat.

A DERBYSHIRE CAVERN.

The recently-issued 'Quarterly Journal of the Geological Society of London,'* contains results of an examination of the contents of a bone cavern in Derbyshire by Messrs. H. H. Arnold-Bemrose and E. T. Newton, which is one of the most valuable contributions of the kind we have had in recent years. The cavern

* Brigg Church and Town. Jackson & Sons, Brigg. 1s.

† Vol. 61, Part 1.

is situated at Hoe-grange Quarry, Longcliffe, near Brassington, and was broken into in the course of quarrying operations. Altogether over 8,000 specimens of bones, teeth, etc., have been gathered from the cavern, and these are carefully described in the paper referred to. We learn that 'as soon as the discovery became known the locality was visited by numerous ardent collectors, some of whom came even at night-time and many specimens were taken away.' One of the first precautions, therefore, was to erect a door at the entrance of the cavern to keep out intruders. Details of the various deposits examined are given, and the authors appear to have taken every possible care to derive the greatest amount of information possible from the relative positions of the bones, etc. As regards the original nature of the cavern, which is of Pleistocene age, the authors conclude that some of the bones fell or were washed in through a swallow hole on the roof of the cavern, and that others were introduced by Hyænas which used the cavern as a den. The remains of 27 different animals are recognised, as under :—Lion, Cat, Hyæna, Wolf, Fox, Bear, Badger, Bat, *Bos*, Irish Deer, Red Deer, Fallow Deer, Roebuck, Boar, Rhinoceros, *Elephas antiquus*, Rabbit, Hare, Bank Vole, Field Vole, Water Vole, Field Mouse, Owl, Redwing, Robin, Frog, and Toad. Perhaps the most interesting find is that of the lower jaw of a Lion's whelp, which in the opinion of Prof. Boyd Dawkins is the most important discovery recorded from any cave in this country. The Wild Boar is also apparently a new record for Derbyshire. The paper is accompanied by sections and photographs of the cave, and some very fine illustrations of some of the more interesting mammalian remains discovered.



GEOLOGY.

Large Bog Oak at Horbury.—During the excavations for Horbury viaduct in February 1904, a large oak tree was met with, and had to be cut through whilst making the foundations for the supports. It occurred in the bed of the Smithy Brook (a tributary of the River Calder), three feet down in a layer of black sand and gravel, at a total depth from the surface of 25 feet. It was not entirely uncovered, but that exposed measured over 63 feet in length, the greatest diameter being 3 feet only. I am indebted to Mr. Gibson, assistant engineer, for particulars.—J. W. H. JOHNSON, Thornhill.

NOTE ON THE OCCURRENCE OF THE BELUGA, OR WHITE WHALE, IN THE OUSE.

THOMAS BUNKER,

Goole.

EARLY in April a White Whale or Beluga (*Delphinapterus leucas* Pallas) was captured a little below Naburn Lock, on the Yorkshire Ouse. Its length was 11 feet 8 inches and weight 55 stones. Its colour was dirty white. There was no caudal fin, but a ridge along the back. It had nine or ten small pointed teeth in each jaw. I do not know the sex of this specimen, but a few years ago a female Grampus (*Orca gladiator*) was captured in the Humber, and when opened a fœtus was found.



Beluga Caught in the Ouse, April 1905.

The usual habitat of the Beluga is in the Arctic Ocean, though it may often be seen on the coast of Labrador. It ascends the rivers in search of food, and probably destroys many Salmon and other fish.

In Greenland and on the North American coasts the White Whales, sometimes called White Porpoises, occur in shoals or schools. The skin is used for 'porpoise'-hide boot-laces; though, if trade secrets were no longer secrets, it might become known that the skins of animals much more common, dressed with whale oil, were sometimes substituted.

Records of the White Whale in Britain are very rare. In 'The Naturalist' for September 1903 Sir Robert Lloyd Patterson recorded the first specimen for our county. It was 18 to 20 feet long, and was seen at Scarborough. In the same journal for

June 1904 was figured a specimen caught at the mouth of the Tyne a year previously.

I have kept a record of the Cetaceans that have come under my notice as visiting the Humber and Ouse. Porpoises are common. A Rudolph's Rorqual (*Balaenoptera borealis*) was captured at Goole on the 5th of September 1884. It was 35 feet 6 inches in length and weighed $9\frac{1}{4}$ tons. The skeleton is now in the Natural History Museum at South Kensington. A Lesser Rorqual (*Balaenoptera rostrata*) was found dead in the Ouse near Swinefleet in January 1902. Its baleen was white. It was promptly seized by H.M. Customs, but proved to be a 'white elephant,' and they were glad to get it buried. About 43 years ago an enormous shoal of Pilot Whales (*Globicephalus melas*) visited the Humber.* Twenty-five came up as far as Goole, of which 23 were captured.

In 1881 a Bottle-nose Dolphin (*Delphinus tursio*) was stranded at Goole Ness. The only specimen of the Grampus (*Orca gladiator*) I have recorded (already referred to) was taken in the Humber about 1884, the skeleton of which is now in the South Kensington Museum.

In the entomological collections of the late Philip B. Mason, of Burton-on-Trent, recently disposed of by auction at Stevens' Rooms, were some types and other specimens from the collection of Adrian Hardy Haworth, author of 'Lepidoptera Britannica.'

Reprints of Mr. C. Oldham's papers, 'On Some Habits of Bats, with Special Reference to the Lesser Horseshoe Bat,' and 'On the Occurrence in Britain of the Pacific Eider' are sold at the rooms of the Manchester Literary and Philosophical Society at one shilling each.

The thirty-fourth annual report of the Sheffield Naturalists' Club contains a record of progress during the year. The botanical section has taken the first steps towards making a full and careful investigation of the plant life of the district. The geological section also gives evidence of a desire to accomplish some substantial work. The entomologists record a specimen of the Early Thorn Moth (*Selenia illunariae*) at Wharnccliffe. This species has not been seen in the district for many years. We should also like to congratulate the society and its printer on the amount of matter they can get on the four pages comprising the annual report. The type, however, might with advantage have been a little less microscopic in size, and thus have prevented numerous typographical errors. And a society which can spend £30 on a conversazione, vote £25 to the University, in addition to ordinary expenses, and then have a balance in hand, ought to do more than print these four pages once a year. We hope the geological section will be sufficiently strong next year to insist upon at any rate the publication of the bibliography they are compiling, which should be a very useful piece of work.

* See 'Transactions of the Hull Scientific and Field Naturalists' Club,' Vol. I., Part I., 1898, pp. 1-9; and Vol. I., Part II., 1899, pp. 37-39.

NOTES ON THE COMMON WEASEL.

REV. E. A. WOODRUFFE PEACOCK, F.L.S., F.G.S.,

Cadney, Brigg.

IN 1891 my brother had a sandy barley field badly troubled by rabbits. One evening I helped him to set 15 traps in neighbouring burrows. As we were doing this, Max pointed out the track of a weasel in the sand into one of the holes. It was, however, too late to dig to discover if a weasel had a store there. We visited the burrows early next morning. Not a rabbit had been taken, but seven traps had destroyed as many weasels—a bitch, 'passed milk,' and her six young, the males larger than their mother. The rabbits no doubt had not been 'at home' for some time with the stoat pack in their neighbourhood, but were lying out in the barley, and many of them were shot there the next day.

On the 27th August 1894 I was going down to Newstead. Just before turning a corner on the grass-causey I heard the warning notes of several sparrows calling together. On rounding the bend the whole matter became plain, and I stopped short to watch a singular performance. A dozen sparrows were on the grass, about a yard from the ditch, 'tiptoeing' and peeping through or over the grass blades to view a weasel which was working up to them under the cover of the grass about twenty feet nearer me. Whenever the hunter drew within springing distance the birds took wing, and flying another thirty feet settled in the grass and began to call the weasel on further down the causey. It most eagerly followed them up. The performance went on regularly for some fifteen minutes, gradually drawing the players away from me all the time. It was ended quite unexpectedly by the sudden appearance of a sparrow-hawk, no doubt called to the spot by the birds' cries. His stoop at the birds failed, and they sought security in the then thick hedge. The hawk did not attempt to tackle the weasel. I could find no wounded or dead sparrow on the road, and can give no explanation of the manoeuvres of the birds, unless they were playing with the Weasel out of pure 'cussedness.'

On Friday, 19th October 1900, a lovely, open autumn day, I visited Kettlebythorpe Wood with my brother Max. Along its side we had a fine view of a weasel following a rabbit by scent like a bloodhound. It ran along the track with its nose

to the ground, very rarely 'crossing,' and then only when another rabbit or bird track intercepted the scent. Its quarry was a half-grown rabbit, which constantly came into the open for a run of a few yards, and then threaded the rather open hedge into the cover again. The actions of the rabbit and Weasel were usual under the circumstances, and must have been viewed by every student of nature. What was quite new to us both was the indifference showed to what was taking place by other rabbits and pheasants which were out on the grass feeding. When the trail brought the weasel quite near to them they almost disregarded it. The hen pheasants would give a little flirting jump, and just move out of the track, and the cocks a vicious dig with their beaks at their passing enemy. More astonishing still, the feeding rabbits moved so lazily and indifferently from the track that three times the weasel was within less than eighteen inches of their bodies. When it passed after a mere glance, they went on feeding as if nothing out of the common were taking place. The weasel, too, was so intent on its tracking that it seemed absolutely indifferent to their presence. We did not see the end of this hunt, but in my experience the tragedy is always the same. The rabbit tires, crouches down in the open generally, but not in this case, and is quickly despatched by a bite on the lower part of the brain.

Obituary.

W. ACKROYD, F.I.C., F.C.S.

It is with very great regret that we learn of the sudden death on May 9th of Mr. W. Ackroyd, F.I.C., F.C.S., of Halifax. Mr. Ackroyd was a most enthusiastic worker, and frequently contributed papers to the Chemical Society, the British Association, and other similar institutions. In connection with the investigations on the underground waters of West Yorkshire carried on by the Yorkshire Geological Society, he rendered signal service. Since 1886 he has been Borough Analyst for Halifax, and also taught chemistry at the Technical School. More recently he has been much occupied in conducting various experiments with radium. Up to the day of his death, when he succumbed to a sudden attack of heart failure, he had enjoyed good health. He was only a little over fifty years of age.

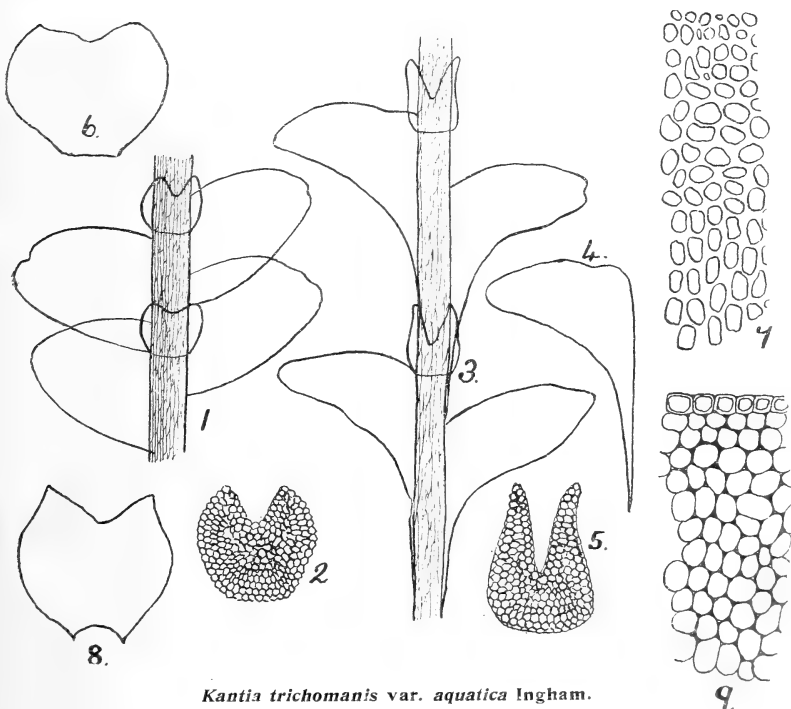
NEW AND RARE HEPATICS AND MOSSES FROM YORKSHIRE AND DURHAM.

W. INGHAM, B.A.,
York.

DURING the meeting of the Yorkshire Naturalists' Union at Buckden, in Upper Wharfedale, from 30th July to 3rd August 1904, I found an important variety of a common and well-known hepatic in two distinct localities, one on Buckden Pike, in Vice-county 62, and one on the moor above Deepdale, in Vice-county 64.

It occurred in large pure patches, distinguished in situ by its peculiar blue-green, or verdigris-green colour.

In both places the habitat was wet peat, and on the Deepdale Moor the hepatic was partly immersed.



Kantia trichomanis var. *aquatica* Ingham.

Fig. 1.—Part of stem of type with outlines of four leaves.

Fig. 2.—Amphigastria or stipule of type.

Fig. 3.—Part of stem of var. *aquatica*, showing outlines of four very decurrent leaves.

Fig. 4.—Outline of leaf of var. *aquatica*.

Fig. 5.—Amphigastria or stipule of var. *aquatica*.

Drs. Arnell and Persson, of Sweden, and Mr. Macvicar, of Scotland, regard it as a notable variety that ought to be described.

It differs markedly from other forms of *Kantia trichomanis* in the very decurrent leaves (giving the stem a winged appearance), and in the ovate and deeply-divided stipules. The very flaccid habit, long stems, and peculiarly-shaped leaves, in addition to the striking blue-green colour are also marked features. I propose, therefore, to describe the plant as a new variety under the appropriate name of *aquatica*.

Kantia trichomanis* var. *aquatica var. nov. In large, pure, interlaced tufts of a peculiar blue-green colour. *Stems* very flaccid, much-branched, and long, often attaining 60 mm., or even more. *Leaves* very decurrent, giving a winged appearance to the stem, of very irregular shape. *Stipules* ovate (not rounded heart-shaped as in type) and very deeply divided. The beautiful blue-green colour, such a marked feature in situ, soon disappears from the plant in the dry state. I may mention that Underwood's *Kantia aquatica* has been lately shown to be a *Lejeunea*.

HABITAT.—Buckden Pike, Upper Wharfedale, in Vice-county 62, by W. Ingham, B.A., and J. W. H. Johnson, B.Sc., of Thornhill, 31st July 1904; also on the moor above the source of Deepdale Beck, Upper Wharfedale, in Vice-county 64, by W. Ingham, B.A., and J. W. H. Johnson, B.Sc., 3rd Aug. 1904.

Marsupella Pearsoni Schiffn. This hepatic, named by Schiffner in honour of Mr. Pearson, the author of the great work on the 'Hepaticæ of the British Isles,' was first published as a new British species in the April number of the 'Journal of Botany' for 1905. On reading the account in the Journal, I at once made one of my gatherings in Teesdale to be the new species, and Mr. Macvicar says mine is certainly the right plant. In the 'Journal of Botany' it is shortly described as follows:— 'It resembles *M. emarginata* in size and habit, but is readily distinguished from that species by its shiny leaves, which are round, with the sinus broad and shallow, sometimes scarcely apparent; lobes round or with an apiculus; cells with very strongly thickened walls, which give them a guttulate appearance.' Mr. Pearson mentions that the plant grows on exposed rocks in somewhat swampy places at about 1,000 feet altitude.

HABITATS.—Borrowdale, Cumberland, April 1893; Rossett Ghyll, Westmorland, and on Snowdon, 1904, all by Mr. Pearson. Kilmun Hills, Argyllshire, October 1904, by C. Scott; White Force, Teesdale, Yorkshire, 5th June 1897, by W. Ingham.

In addition to the above description, three of the above gatherings that I have seen are of a glossy *red* colour, which is probably a constant feature of the plant; also, I find the cells smaller than in *M. emarginata*, and decreasing in size from the middle of the leaf to the margin. A comparison of the leaves of *M. Pearsoni* (Figs. 6 and 7) and of *M. emarginata* (Figs. 8 and 9) will show the different leaf structure.

Marsupella aquatica (Lindenb.) Schiffn. This hepatic I also found at the White Force, Teesdale, on 20th August 1897, and again on 5th June 1898. It is widespread in Scotland, and is recorded from Ireland.

Nardia hyalina (Lyell) Carr. var. ***colorato*** Nees. This beautiful hepatic grows on the moor on the north side of Sedling Burn, Weardale, where I found it on 29th July 1898. It has also been recorded from V.C. 85, Fife-with-Kinross.

Lophocolea heterophylla (Schrader) Dum. var. ***laxior*** Nees grows on a hedgebank at Burghwallis, near Doncaster, where I gathered it on 16th December 1902. It is distinct in its long creeping stems and distant leaves.

***Webera prolifera* Bryhn.**—This moss is plentiful on the sides of a sandstone cavern in Shipley Glen, Bradford. The specimen was abundantly provided with its characteristic gemmæ, resembling ‘an empty kid glove, somewhat twisted, with the fingers sticking out in all directions.’

***Jungermania inflata* var. *compacta* Nees.**—This hepatic, the type of which is so frequent in bogs, I found strangely mounted on one of the large masses of millstone grit in Shipley Glen, Bradford, 13th February 1905. It is a very distinct variety both in its compact habit with upright stems and in the shape and cell structure of the leaf. Verified by S. M. Macvicar.

***Aplozia lurida* Dmrt.**—This rare hepatic, with perianths, I found abundantly on a wet sloping bank at Marske Mill, Saltburn, Vice-county 62, on 22nd August 1900, but have only recently examined it and determined it. Mr. Macvicar confirms the record.

Teratology in Mosses.—This subject has received very scant attention from bryologists, which is my reason for mentioning the following remarkable case:—On 7th May 1900, I found the rare moss *Barbula convoluta* var. *Sardoa* B.&S. on the edge of a narrow cinder path between two high walls in what is called in Yorkshire a ‘ginnel.’ This was at Barkstone, in Vice-county 64. The pellucid apical cell of the nerve in this gathering bifurcates, with the two parts almost at right angles

to each other. This gives a curious appearance to the leaf. On 22nd March 1905, I found the same moss of a very striking yellowish-green colour on a brick wall in the open field at the new drainage works at Naburn, in Vice-county 61. I was surprised to see the same bifurcation of the pellucid apical cell of the nerve in this specimen also. I think there could scarcely be a connection between the two cases, as the two habitats are ten miles apart as the crow flies; also the Barkstone habitat is very much in shade, and sheltered from wind, whereas the Naburn one is quite exposed in the open. I must say the Naburn specimen had the appearance of being a new arrival. Since writing the above I have received from Mr. J. W. H. Johnson, B.Sc., of Thornhill, a specimen of the var. *Sardoa*, growing at that place, which also shows the bifurcation of the apical, excurrent cell. It was gathered by him on 27th March 1905.

No. 4 of the 'Bradford Scientific Journal' is excellent. The editors are now evidently doing their utmost to make this publication of permanent local value, and are printing a much greater proportion of notes dealing with the Bradford district. In the April issue there are notes on 'Cinerary Urn on Baildon Moor,' 'Yorkshire Place-Names,' 'Sallow Bloom and Insects,' 'Arrival of Migrant Birds,' 'Distribution of Plants,' 'Glacial Geology of the Bradford and Keighley District,' and 'Flight of Birds.' These have been contributed by Messrs. W. E. Preston, Butler Wood, J. W. Carter, E. P. and R. Butterfield, J. Beanland, A. Jowett and H. B. Muff, and Alfred Walker, respectively. The part contains 32 pages and a plate, and is well worth the 6d. charged.

Another work which will do much to popularise the study of our wild flowers is being issued by Messrs. Cassell & Co., viz., a new fortnightly edition of 'Familiar Wild Flowers,' by F. E. Hume, F.L.S., F.S.A. For this issue 40 new coloured plates have been expressly prepared, which will be added to the 280 now appearing in its pages, making 320 in all. An entirely new feature of this issue will be a coloured index, in which the various wild flowers figured in the work will be grouped according to their colours. This will be given in addition to the alphabetical indices.

A charming work by Mr. E. Step, F.L.S., is now being issued in twelve fortnightly parts at 8d. net by Messrs. F. Warne & Co. It is entitled 'Wild Flowers Month by Month in their Natural Haunts.' The first part, which is before us, contains a description of the flowers of March. The letter-press is well written and contains much useful information in reference to the flowers found blooming in the spring. But the most interesting part of the work consists of the numerous plates and other illustrations taken from photographs showing the plants in their natural surroundings. These are all that can be desired.

The 1905 issue of 'Who's Who' (A. & C. Black, London; 7s. 6d.) is to hand. It has been brought up to date, and every possible care appears to have been taken to include in it the information likely to be of value. It is a wonderful volume for the money, and is indispensable to business men. 'Who's Who Year Book' (1s.) is a companion volume containing statistics, etc., relating to various societies, the press, etc.; and 'The Englishwoman's Year Book and Directory' (2s. 6d.) is equally useful to the women folk. It is edited by Emily Janes.

YORKSHIRE NATURALISTS AT RIPON.

THE year's field work of the Yorkshire Naturalists' Union started on Saturday, 6th May, when an exceptionally large attendance of members mustered at Ripon. Among those present were contingents from no fewer than eighteen societies in Leeds, Bradford, Halifax, Huddersfield, York, Hull, Middlesbrough, Darlington, Malton, and Lindley, and they were welcomed and assisted by a strong body of the Ripon naturalists. The Union was, unfortunately, deprived of the advantage of the presence of the president, Mr. G. W. Lamplugh, F.G.S. Mr.



Photo by]

The Skell Gorge at Mackershaw.

[Godfrey Bingley.

Lamplugh has, however, other important work in hand. The British Association has done him the honour of selecting him to go out to the Zambesi to make geological investigations in the neighbourhood of the great Victoria Falls. The Marquis of Ripon, who is not only a member but takes a keen interest in the work of the Union, was also prevented from welcoming the members to his estates, but he had with his customary kindness made the fullest arrangements for the examination by the visitors of the woods about Studley Royal and of the grounds of

Fountains Abbey. The party met at the Town Hall, Ripon, where they were received by the Town Clerk, and a few minutes were spent in inspecting the little museum which is at present stored there. The building of the new Ripon Spa Baths and Pump Room has displaced the old museum formed by the Ripon naturalists, though it is understood that a new and much more convenient home will shortly be prepared for its reception. The collection, though containing some odds and ends more curious than edifying, is one of great value. The party inspected with special interest an excellent collection of coleoptera made by Lord Ripon himself in the days before his political duties had diverted him from that active participation in scientific work in which he delighted as a young man. The charters of the city, some other of its ancient records, and the remains of its once extensive but now sadly diminished store of silver plate were also exhibited and inspected.

Leaving the Town Hall at about eleven o'clock the party made their way, under the guidance of Mr. B. M. Smith and Mr. T. Pratt, by Borrage Lane, to the banks of the Skell, and followed that stream up its course to Fountains Abbey. For a mile or so upward from its junction with the Laver, the Skell is a fast running stream, sunk in a deep gully in almost flat lands, and with little picturesqueness to boast of. Presently the valley closed in with low-wooded hills, and the Mackershaw Woods were reached. Here the joys of the botanists really began. All through the wood the way was carpeted with Primroses and Wood Anemones, with here and there a patch of Avens or of Garlic coming into flower, or a fine head of the Spotted Orchis. And every tree, except the still gaunt Ash and Elm, was beginning to put on 'her mantle green.' The Lily of the Valley also grew in abundance. Very likely it is truly wild, though botanists are a little apt to look with suspicion, as perhaps due to human interference with nature, on records for such plants in localities which have received so much attention from the gardener as Studley.

Beyond the woods the river flows in a narrow valley shut in with high cliffs of the Permian, and crossed with numerous little rustic footbridges. The lake from which the Skell flows—the lake which is so important a feature of the scenery by the entrance to the grounds of Fountains Abbey—was at the moment drained, and a foot or so of the mud from the bottom was being removed, a little railway having been constructed to facilitate the work. The examination of the mud-heap provided abundant

work for the conchologists, and many shells, including some very large specimens of the great Swan Mussel (*Anodonta cygnæa*), were found. Inside the grounds of the Abbey the botanical guides were able to point out a good many flowers of much interest, the most notable being a pretty and rare rose-purple variety of the common Wood-sorrel. Herb Paris and the Toothwort grew in the shrubberies, and the brilliant blue of the wood Forget-me-Not made gay the banks near the Abbey ruins, whilst the ruins themselves were full of Primroses. The Mouse-ear Chickweed (*Cerastium glomeratum*), the vernal Whitlow Grass, the Golden Saxifrage, the Oxlip, the Bittercress, the Yellow Archangel, the Spring Woodrush, the Yellow Corydalis, and the Wild Pink were among the flowers which were recorded.

The geologists, led by the Rev. W. Lower Carter, F.G.S., made some attempt to study the glacial geology of the locality. It is evident that the whole of the Studley district was at the height of the Ice Age overridden by the ice. Great banks of sand and gravel, sometimes stratified, are being worked between Ripon and Studley; and there are indications of boulder clay, with abundance of boulders of Wensleydale rocks, in many parts of the district. All these facts indicate that there is an interesting story to be unravelled. But the glacial geology of the district has hitherto remained almost untouched, and much requires to be done before any understanding of the broad lines of its history is possible. Several hollows, which looked upon the six-inch Ordnance map as though they might prove to be deserted overflow valleys of some lake held up by the Yaredale glacier, were visited, but with one possible exception all proved not to be overflows, but to be merely accidental inequalities in the surface of the gravels. Evidences were noticed which suggested to Mr. Carter the probability that the Skell in pre-glacial times turned to the left by the present lake in Studley Park, and had its ancient course close to the site on which Lord Ripon's house now stands; that this course was choked with gravel and clay by the instrumentality of the Yaredale glacier, and that the course of the river by way of Mackershaw Woods—the way by which the botanists approached Studley—is a new channel. How far that may be the fact further work will, no doubt, in time reveal. The ornithologists had a good time, for Ripon and Studley are delightful spots for their studies. The Kingfisher was seen on the bank of the Laver; Sand-Pipers abounded on the Skell, and the Marsh-Tit—elsewhere rarely to be seen, but here abundant—the Cole-Tit,

and the Great-Tit competed with the gaily-clothed Chaffinch and the demure Hedge-Sparrow for the crumbs which fell from the tables in the gardens of the refreshment house at the entrance to Fountain Abbey grounds. The entomologists found little to do in connection with butterflies and moths, but some good beetles were boxed.

After tea a meeting was held, Mr. A. H. Pawson, J.P., presiding. Ten new members were elected, and three societies became affiliated with the Union. Reports of the work accomplished in the various branches of natural history were then given by the officers of the sections. Written reports from some of these have since been received, and are printed below.

For the foregoing report of the day's excursion we are much indebted to Mr. H. E. Wroot.

For Vertebrate Zoology Mr. Riley Fortune, F.Z.S., writes:—The valleys and woods were filled with a volume of bird-song. Mackershaw Wood abounded with Wood Wrens, and their peculiar song was heard on all sides. Sandpipers were very plentiful and noisy. Two pairs of that distinctly local bird, the Pied Flycatcher, were observed, but the more common species, the Spotted Flycatcher, was not in evidence. Near Hell Wath, in a big limestone cliff, numerous Starlings had found nesting sites, some of them being very near the ground and only a few inches in the rock. Practically all the resident birds were busy nesting, in many cases feeding their young. The summer visitors had apparently not yet commenced to think about family matters. It was extremely interesting to note the comparative tameness of the birds about the Refreshment House; they are evidently used to being fed by visitors. Chaffinches in the full glory of their summer plumage were plentiful, and quickly pounced upon every morsel thrown to them. With one exception, this species was represented by males, the females evidently having other matters requiring their attention. Blue, Great, Cole, and a pair of the rarer Marsh Tits appeared amongst other birds to take a share in the feast. During the day the following species were observed:—

MAMMALS (8).

Hedgehog.	Weasel.	Hare.	Red Deer.
Stoat.	Rat.	Rabbit.	Fallow Deer.

BIRDS (47).

Pied Flycatcher.	Song Thrush.	Robin.
Dipper.	Blackbird.	Garden Warbler.
Missel Thrush.	Hedge Warbler.	Blackcap Warbler.

Naturalist.

Wood Warbler.	Yellow Wagtail.	Kingfisher.
Willow Warbler.	Tree Pipit.	Swallow.
Chiffchaff.	Meadow Pipit.	Martin.
Goldcrest.	Skylark.	Sand Martin.
Wren.	Yellow Bunting.	Ring Dove.
Tree Creeper.	Chaffinch.	Stock Dove.
Nuthatch.	House Sparrow.	Pheasant.
Great Tit.	Greenfinch.	Partridge.
Blue Tit.	Starling.	Sandpiper.
Cole Tit.	Rook.	Waterhen.
Marsh Tit.	Jackdaw.	Mute Swan.
Pied Wagtail.	Great Spotted Woodpecker.	Wild Duck.
Grey Wagtail.	Cuckoo.	

FISHES (7).

Trout.	Grayling.	Chub.	Dace.
Roach.	Minnow.	Perch.	

AMPHIBIANS (1).

Frog.

Mr. J. E. Crowther reports that with the exception of three or four species, molluscan life generally was but thinly distributed. Only six species of slugs were noted during the day. A couple of *Limax maximus* were found under a piece of wood at Studley. *Agriolimax agrestis*, mostly of the light grey form, was found all along the route traversed. *Arion ater* occurred at Studley, and a single *A. intermedius* in Mackershaw Wood; *A. hortensis* was found at Fountains, and *A. faciatus* occurred sparingly everywhere. Six species of *Zonitidae* were obtained during the day. Dead shells of *Vitrina pellucida* were found at Whitecliffe, Studley, and Fountains. *Vitræa cellaria* was fairly plentiful everywhere, three specimens of *V. rogersi* (probably the best find of the day, and the only one not mentioned in the excursion programme) were found under a plank in the grounds at Fountains, and *V. nitidula* near the Abbey ruins; *V. crystallina* and *V. alliaria* occurred at Studley and Fountains, and the latter also near the junction of the Skell with the Laver. *Helix aspersa* and *H. hortensis* were found in Borrage Lane. *Hygromia granulata* was found at Studley and Fountains, *H. rufescens* was plentiful near the junction of the Skell and the Laver, and *H. hispida* and *Pyramidula rotundata* were found at all these places. *Cochlicopa lubrica* occurred at Studley and Fountains, and a single *Azeca tridens* in the Abbey grounds. *Clausilia laminata* was plentiful in Mackershaw Wood, and *C. bidentata* all the way. There were few opportunities of finding freshwater species. *Ancylus fluviatilis* with *Limnæa pereger* were plentiful in the Skell below Whitecliffe,

and a peculiar form of the latter was found in the spring at Hell Wath, along with *Pisidium subtruncatum*. *Anodonta cygnæa* was very plentiful in the Skell below the lake at Studley, which was let off for the purpose of being cleaned out. They probably have been washed out of the lake by the force of the stream. *Unio pictorum* was also found sparingly in the same place. Both *Unio* and *Anodonta* were very plentiful in the bed of the lake, and also in the mud which had been carried out. *Bythinia tentaculata* and *Spherium corneum* also abounded in the bed of the lake. In one of the ornamental ponds in the Abbey grounds a single *Planorbis albus* was found, with numerous dead shell of *Unio* and *Anodonta*.

The coleopterists present were Messrs. J. W. Carter, F.E.S. (President of the Entomological Section), and M. L. Thompson, F.E.S. The latter writes:—The warmth and sunshine prevailing throughout the day were most favourable for the appearance of beetles. Following the river Skell, through Mackershaw Wood, and the grounds of Fountains Abbey, the following species were met with:—

<i>Clivina collaris</i> Herbst.	<i>Coccinella 7-punctata</i> L.
<i>Amara plebeia</i> Gyll.	<i>Halysia 22-punctata</i> L.
<i>Cercyon melanocephalus</i> L.	<i>Brachypterus urticæ</i> L.
<i>Cercyon pygmaeus</i> Ill.	<i>Eburæa æstiva</i> L.
<i>Cryptopleurum atomarium</i> Ol.	<i>Meligethes æneus</i> F.
<i>Aleochara fuscipes</i> F.	<i>Coninomus nodifer</i> Westw.
<i>Tachyporus chrysomelinus</i> L.	<i>Atomaria nigriventris</i> Steph.
<i>Tachyporus hypnorum</i> F.	<i>Atomaria analis</i> Er.
<i>Tachinus rufipes</i> DeG.	<i>Aphodius fimetarius</i> L.
<i>Tachinus marginellus</i> F.	<i>Geotrupes stercorarius</i> L.
<i>Philonthus splendens</i> F.	<i>Agriotes pallidulus</i> Ill.
<i>Philonthus intermedius</i> Bois.	<i>Chrysomela polita</i> L.
<i>Philonthus æneus</i> Ross.	<i>Phædon tumidulus</i> Germ.
<i>Philonthus varius</i> Gyll.	<i>Longitarsus suturellus</i> Duft.
<i>Philonthus marginatus</i> F.	<i>Phyllotreta tetrastigma</i> Com.
<i>Stenus junio</i> F.	<i>Crepidodera aurata</i> Marsh.
<i>Stenus similis</i> Herbst.	<i>Plectroscelis concinna</i> Marsh.
<i>Platystethus arenarius</i> Fourc.	<i>Apion dichroum</i> Bed.
<i>Oxytelus rugosus</i> F.	<i>Apion humile</i> Germ.
<i>Oxytelus nitidulus</i> Gr.	<i>Phyllobius pyri</i> L.
<i>Oxytelus tetracarınatus</i> Block.	<i>Sitones lineatus</i> L.
<i>Megarthus denticollis</i> Beck.	<i>Liosoma ovatum</i> Clair.
<i>Silpha rugosa</i> L.	<i>Cæliodes quadrimaculatus</i> L.
<i>Silpha atrata</i> L.	<i>Ceuthorrhynchus contractus</i> Marsh.
<i>Catops sericeus</i> Pz.	<i>Ceuthorrhynchus pollinarius</i> Först.
<i>Coccinella 10-punctata</i> L.	<i>Ceuthorrhynchidius floralis</i> Payk.

For the Mosses and Hepatics Mr. Wm. Ingham writes:—Although such a beautiful district, I did not find it well adapted

to the growth of these plants. Nowhere was seen a luxuriance of mosses, such as may be seen elsewhere in the Riding. In the route taken there was no sign of either Bog Mosses (*Sphagna*) or of any of the Harpidioid Hypna. Five Hepatics or Liverworts were seen, four of them being frondose and only one foliose. The former are *Conocephalum conicum*, in abundant fruit; *Lunularia cruciata*, in the gemmiferous state; *Blasia pusilla*, and *Pellia epiphylla*, all by the Skell. Mr. Johnson found the only foliose one, *Plagiochila asplenoides* var. *Dillenii*, by the side of a wood. The true mosses gave the best results. Rare mosses are:—A large state of *Brachythecium populeum* and *Leucodon sciuroides* on a wall by the side of the path. *Fissidens crassipes* also occurs, but in the barren state. The other mosses seen and examined, but not mentioned in the List in the Union Circular, are *Amblystegium serpens*, *Eurhynchium murale*, *E. rusciforme*, and *Fontinalis antipyretica* of the Pleurocarpous Division of Mosses, and *Barbula rubella*, *B. lurida*, and *B. cylindrica*, of the Acrocarpous Division.

Mr. C. Crossland writes:—About twenty species of fungi were met with, mostly of common occurrence. Among them were *Pluteus cervinus*, *Pholiota præcox*, *Psilocybe fæniseeii*, *Anellaria separata*, *Polystictus versicolor*, *Poria blepharistoma*, *Stereum purpureum*, *S. hirsutum*, *Corticium calcium*, and *Lycogala epidendron*. *Exidia glandulosa* was found growing on a bared root-branch of a living oak. One of the most interesting things found was *Mitrophora semilibera*, one of the spring morels. A fine specimen of *Peziza reticulata* was picked up in Fountains Abbey grounds; also *Dasyscypha sulfurea*, the latter on decaying herbaceous stem. The remains of a dead thorn tree lying in a damp field were overhauled, and yielded *Dædalea latissima*, *Dialonectria sanguinea*, *Dasyscypha nivea*, *Mollisea cinerea*, and *Trichia varia*. *Helotium citrinum* was seen to be commencing its season's growth in its accustomed matrix—rotten wood—in Mackershaw Wood. *Gyromitra esculenta* was carefully looked for, but without success. Mr. Waterfall reported *Morchella esculenta* from near Tanfield.

Mr. A. J. Stather writes:—The Geological Section once more demonstrated the fact that it is possible to spend an interesting and profitable day geologising without the aid of a large hammer and numerous collecting boxes.

Under the guidance of the Rev. W. Lower Carter, and with the help of maps specially prepared by Prof. P. F. Kendall, the party set out to investigate the conditions of the Skell Valley

during the Glacial Epoch. The route taken was up the valley of the Skell from Ripon, near to which place several sections of boulder clay were examined in the river bed, in which boulders, probably from the Wensleydale district, seemed to predominate.

The next interesting feature of the valley was the limestone cliff at Whitecliffe, near to which is the 'Hell Wath,' a very strong spring, no doubt the reappearance of one of the underground rivers so common in limestone districts. The party next directed their attention to a number of 'Overflow Valleys' (now dry), due to the blocking up of the Skell waters during Glacial times. Examples of these were noted in the neighbourhood of Sawley.

On the return journey a steep descent was made into the Skell Valley at Spa Gill, where the sulphur springs were tested and commented upon.

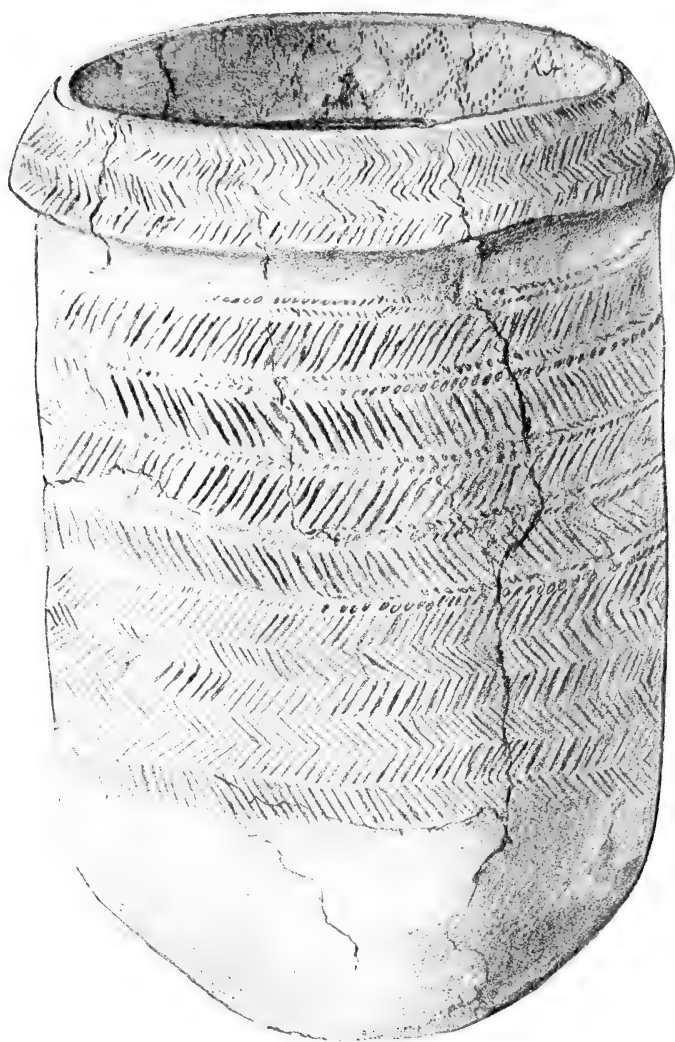
At the next meeting of the British Association, to be held at Cape Town, the President of the Yorkshire Naturalists' Union, Mr. G. W. Lamplugh, F.G.S., will deliver a lecture. At the same meeting Mr. Harold Wager, F.R.S., presides over the Botanical Section.

In some notes on 'Types of the Genera of the Agdistid, Alucitid, and Orneodid Plume Moths' ('Entomologists' Record,' February), Mr. J. W. Tutt proposes a new genus, *Porritia*, type *galactodactyla*, in honour to Mr. G. T. Porritt, author of the 'List of Yorkshire Lepidoptera.' In the same journal Mr. R. S. Bagnall records an addition to the Hemiptera of the Northumberland and Durham district, viz., *Zicrona cœrulea*.

A useful article dealing with common misconceptions and misstatements in regard to bird-protection law, which should be read by all interested in the subject, appears in 'Bird Notes and News' (issued by the Royal Society for the Protection of Birds) for April. The annual report of this Society, recently to hand, shows a record of good work. During 1904 the Society obtained 130 convictions under the Wild Birds Protection Acts, and 29 under the Wild Animals in Captivity Act as regards birds.

The Hon. J. Abercromby has, in the Proceedings of the Society of Antiquaries of Scotland, a valuable contribution entitled, 'A proposed Chronological Arrangement of the Drinking Cup or Beaker Class of Fictilia in Britain.' In this he deals in detail with the beaker type of British vases found in tumuli, the making of which he considers lasted about two hundred years. The paper is illustrated by no fewer than 171 process blocks from photographs of drinking cups from various parts of Britain.

A recent impression of the 'Eastern Morning News' (Hull) states that naturalists have cause of complaint against the Act which fixes the beginning of the close season for sea birds at 1st March. One 'naturalist' (at Filey) 'who probably knows more about the birds of Bempton Cliffs than anyone else, and who is keenly anxious that the terms of the Act should be altered, points out that under the present conditions it is absolutely impossible to secure a bird in the summer plumage!' The 'sportsmen' who shoot from a boat at the lower rock ledges are also credited with the 'ruthless slaughter' of the sea-birds. But surely those individuals, well known to the Filey 'naturalist,' who contract with London firms for the supply of thousands of sea-birds, are equally to blame, if not more so.



H. $\frac{1}{2}$

Pre-Historic Remains from East Yorkshire.

PRE-HISTORIC REMAINS IN EAST YORKSHIRE.

IN our May issue we referred in somewhat general terms to the nature of the work recently published dealing with the pre-historic relics found in East Yorkshire. The book contains material for an unlimited number of essays dealing with almost every branch of pre-historic archæology. In the present article, however, reference can only be made to some of the more interesting objects found in the burial mounds, examples of which are figured on Plates VI., VII., IX., and X. Amongst those most frequently met with are earthenware vessels and stone implements, though objects of bone, bronze, jet, etc., also occur in association with interments. Reference to the accompanying plan and section of a barrow at Acklam Wold admirably illustrates the crouched positions in which the skeletons are usually found, as well as the positions occupied by the vessels and objects occurring therewith. As will be seen from the section, most of the burials were made in graves cut into the solid chalk. These were covered by a mound of chalk rubble, and at some

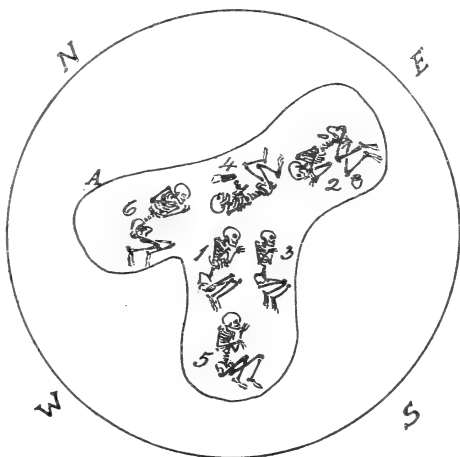


Fig. 1.

later period a secondary interment (Fig. 2, No. 2) was cut into the rubble, the whole being covered by a mound of tough clay.

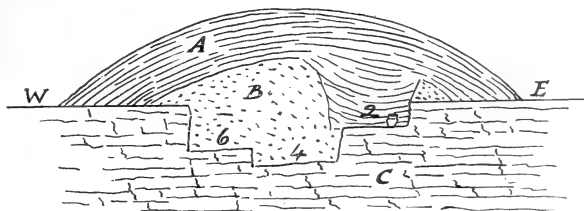


Fig. 2.

With regard to the earthenware vessels: these can be roughly classified into four varieties, viz.:—(1) Cinerary urns, usually of large size and containing cremated human bones; (2) food vessels of smaller size, somewhat in the form of a truncated cone; these frequently contain remains, probably of food, which have been buried with the interment; (3) the so-called 'drinking-cups,' cylindrical vessels generally highly ornamented, which rarely contain any foreign matter; and (4) incense cups, small vessels found in association with cremated interments. Whilst the vessels can be classified into easily distinguishable types, occasionally examples are found of very unusual form, and of these East Yorkshire has produced a very fair series. On Plate IX. is given a representation of a food vase of an altogether unique type, which was found in a barrow on land known as Wayrham, on Painsthorpe Wold. Mr. Mortimer considers this vessel to be possibly a type of the domestic pottery of the Britons, which is very rarely found in the burial mounds. In the same barrow a food vase of somewhat unusual form, shown in Fig. E, Plate VII., was discovered. In Plate X., Fig. L, is figured a semi-globular vessel, supplied with four perforated feet. This occurred in a barrow on Acklam Wold.

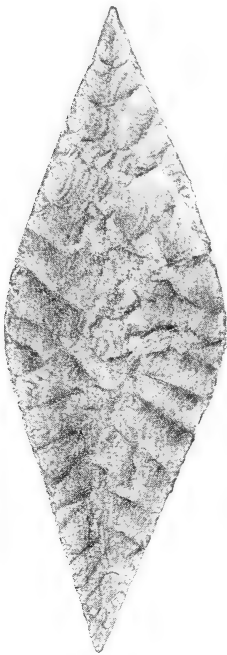
Amongst the implements of flint several very fine examples have been met with. On Plate VI., Fig. B, is figured a polished flint axe head, found together with quite a large collection of valuable specimens, in Duggleby Howe, an exceptionally large burial mound on Towthorpe Wold. The same barrow yielded an object of polished flint of extraordinary thinness and delicacy, figured on Plate VII., Fig. D. Plate VI., Fig. A, is a representation of a very fine flint dagger found at Garton Slack, whilst on Plate X., Figs. I and K, are two flint spear-heads of unusually fine workmanship from Towthorpe and Calais Wold respectively. On Plate VII., Fig. G, is a very fine flint knife from Painsthorpe Wold. The Duggleby Howe tumulus also yielded a hammer-head made from a piece of an antler of the Red Deer (Plate VII., Fig. F), and a curved bone pin (Plate VI., Fig. C).

CINERARY URNS.

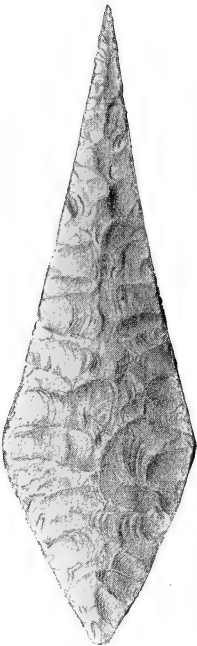
The recent issue of the 'Bradford Scientific Journal' contains a photograph of a cinerary urn, which we are permitted to reproduce. It was found on Baildon Moor whilst making excavations for an extension of a golf course. It was in

Naturalist,

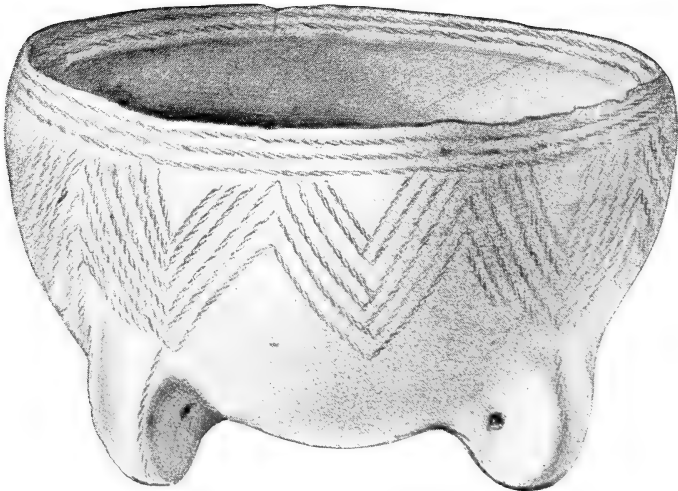




I. $\frac{1}{1}$



K. $\frac{1}{1}$



L. $\frac{1}{2}$

a fragmentary and damaged condition, but was repaired at the Hull Museum, and is now on exhibition in the Cartwright Hall, Bradford. As will be seen from the accompanying illustration (Fig. 3), the vase, which contained cremated remains, is of the usual cinerary urn type, having a wide mouth and a small base. The upper two-thirds of the vase is cylindrical, the lower third suddenly tapering to the base. At the upper part of the vase is a collar, which slightly projects from the remainder of the vessel. This is ornamented by impressions from a twisted cord and thong, made on the clay whilst soft. These are alternately vertical and horizontal, the latter impressions averaging half an inch apart, the former being slightly closer together. Below this collar the remainder (four inches) of the vertical sides of the vase is ornamented with crude herring-bone designs, scratched in the clay with some sharp instrument. These scratches occur alternately at an angle of about 45 degrees from the perpendicular.



Fig. 3.

As is usual in earthenware vessels of this description, the edge or rim, which is perfect, slopes inwards at an angle of about 45 degrees, and is from half an inch to three-quarters of an inch across. It is ornamented by two vertical rows of thong impressions. The inside of the vase is perfectly plain; the base is not quite in the centre, and the vessel bears every evidence in its irregularities of its hand-made character. It has been well burnt, though in some parts better than in others.

The variations of the ornamentation upon earthenware vessels found in British barrows has only lately been thoroughly recognised, and in the case of the beakers or drinking vessels the Hon. J. Abercromby has recently* very

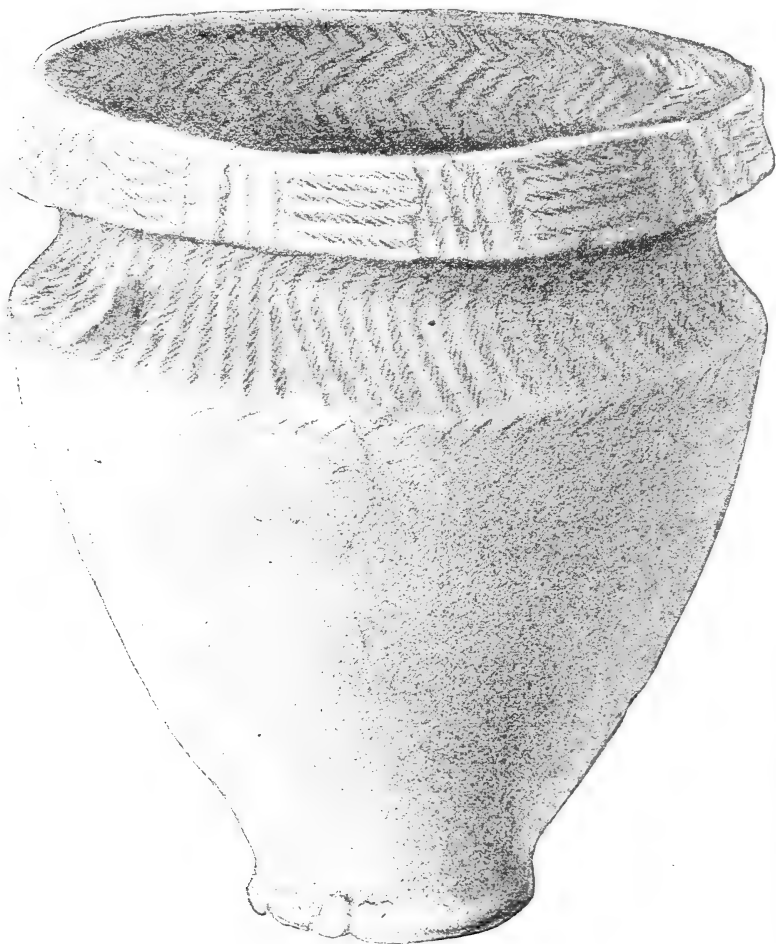


Fig. 4.

carefully examined and classified a great number of British examples according to their shape, ornamentation or associated relics. Whether all his conclusions will be accepted or not, the

* Proc. Soc. Antiq. of Scotland.

fact unquestionably remains that his method of observation is on the right lines, and it would well repay anyone to compare the various forms of ornamentation, etc., in other types of vessels; for instance, the alternate rope-work pattern on the collar or upper part of the cinerary urn found on Baildon Moor bears great resemblances to that upon some cinerary urns found



Fig. 5.

in Mr. Mortimer's field of operations. As examples we are permitted to reproduce from his work two illustrations which bear some resemblance to the Bradford vase. The first (Fig. 4) is a cinerary urn found in a barrow at Hanging Grimston, and the second (Fig. 5) a smaller vessel found at Calais Wold. In both cases the upper parts are ornamented with alternate horizontal and vertical cord impressions, and in one instance the inside of

the vase has two cord impressions running round it, precisely similar to that on the vase from Baildon Moor. In no case, however, is an East Yorkshire urn ornamented by the herring-bone design exhibited on the Bradford vase, the two examples from East Yorkshire herewith reproduced being ornamented by cord impressions and thumb nail imprints respectively. Vases with similar ornamentation to that on the Bradford urn are illustrated in both 'British Barrows' and 'Ten Years' Diggings.'

An examination and comparison of the cinerary urns figured in the works of Messrs. Mortimer, Greenwell, Bates, and others would unquestionably lead to interesting results, and it is to be hoped that someone will follow up this line of research.

FIELD NOTES.

BIRDS.

Bird Notes from Easington.—A Kingfisher was killed by flying against the Spurn Lighthouse on 4th May. This is the first such occurrence for this species that I remember. A Grey Phalarope was seen at Easington on 6th May. I heard the Cuckoo for the first time this season on 25th April; saw the first pair of Wheatears on 24th April, and the first Chiffchaff on 26th April. A Lesser Tern was killed by the telegraph wires at Spurn on 7th May.—P. W. LOTEN, Easington, 10th May 1905.

The Mallard and Her Young.—So far as my notes go I cannot discover that anyone has put on record how the duck removes her young. The bird must have been viewed many times in the act, but everyone seems to have thought the occurrence too common to record. I have seen the mother bird in the act of removing her duckling three times. On the last occasion, while out with my son Dennis on Cadney Beck, 20th August 1902, a wild duck flew past us going up stream. I paid no attention to such a common sight as a passing duck. When the lad called out, 'She has something in her bill,' I turned the field-glass on her and could distinctly see the duckling, only just hatched, she was bearing from the nest to some place of security not far from some quiet water. Just in the same way the mother duck will carry her eggs from the nest if she has more than she can cover (?). I have never seen this, but old Tom Tacey, of Ashby Decoy, did frequently during his life-long experience. The egg to be removed is left above the felted quilt of feathers

which covers the nest when the mother-bird leaves it for food, and on her return it is carried away, and dropped into the nearest water, whether stream or pond does not matter. Many years ago, as a lad, I saw the egg above the nest covering, and later on in 18 inches of water in the pond. It was not cracked, and as much incubated as the others in the nest would be. Why the mother-duck under certain circumstances removes one or more of her eggs requires further explanation. The usual one, that she cannot cover them all, is hardly satisfactory when we consider the wonderful nest the Mallard constructs.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 27th March 1905.

FUNGI.

Stilbum acicula (Berk.) Sacc. appeared as a small, watery white drumstick, about $\frac{1}{12}$ of an inch in length, growing on a rhizome of *Davallia bullata* in a greenhouse. It was under observation two or three weeks, being mistaken for the sporangia of a Myxomycete.

Monosporium olivaceum Cke. & Mass.—An olive-brown velvety patch effused several inches on the underside of a decaying half-submerged log. Both the above belong to the Hypomycetes, which is characterised by abundant hyphæ bearing naked conidia.

Badhamia panicea Rost.—This Myxomycete was found in quantity on elm logs in a wood-yard at Selby on the 4th May. Mr. Chas. Crossland has identified these three species and reports them to be new Yorkshire records.—W. N. CHEESMAN.

Humaria convexula (Pers.) Quel., in North-east Yorkshire.—On 8th April 1905, my son Wilfrid found this interesting Peziza on the bare sandy side of a narrow ditch in a wood bordering upon Strensall Common. Although a very small fungus, the brilliant scarlet ascophores revealed its presence. Mr. Crossland, who identified it, says it is an addition to the Fungus Flora of North-east Yorkshire, Vice-county 62.—WM. INGHAM.

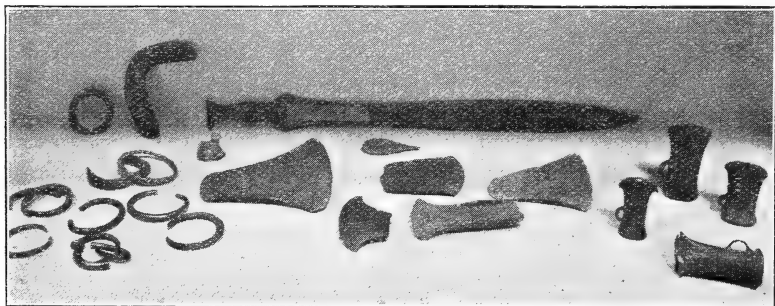
Fungi New to Britain.—Mr. W. A. Thwaites, of Masham, has recently forwarded to Kew two species of microscopic fungi which Mr. Masee finds are new discoveries in this country, viz.:—*Discula Fagi* Oudem., on dying Beech seedlings; and *Herpotricha nigra* Hartig, on seedlings of Scots fir. Anent the latter, Mr. Masee makes the following instructive remarks:—‘A destructive parasite, when once introduced into a nursery of

conifers. The leaves are attacked and soon killed, but do not fall to the ground, being held to the branch by fine threads of a dark-coloured mycelium. By this means large tufts of dead leaves accumulate on the branches of attacked seedlings.'—
C. CROSSLAND, 3rd May 1905.

REVIEWS AND BOOK NOTICES.

MANX ANTIQUITIES.

In the Eighteenth Annual Report of the Liverpool Marine Biology Committee* there is a valuable appendix, by Messrs. P. M. C. Kermode and W. A. Herdman, dealing with the antiquities of the Isle of Man. In this the authors have not only gathered together all the information available relating to



Bronze Weapons, from the Isle of Man.

the early history of the island, but have also included particulars of the results of their own excavations on very important sites. Not the least interesting of these refers to the Meayll stone circle, originally described in a pamphlet in 1893 and long out of print. In addition to this and other stone circles, the paper deals with ancient pottery, bronze and stone implements, cists, cairns, carved stones, runic inscriptions, ancient buildings, coins, rush-light holders, and, in fact, all the numerous and interesting forms of relics of by-gone days that appear to abound on the island. Most of these are figured, a feature which adds considerably to the value of the pamphlet. By the courtesy of Prof. Herdman we are permitted to reproduce three of the illustrations. The first (Plate XIII.) is from a photograph of a skeleton of the Irish Elk, recovered from Close-y-garey in

* Issued at the Biological Station at Port Erin at 1s. 6d.

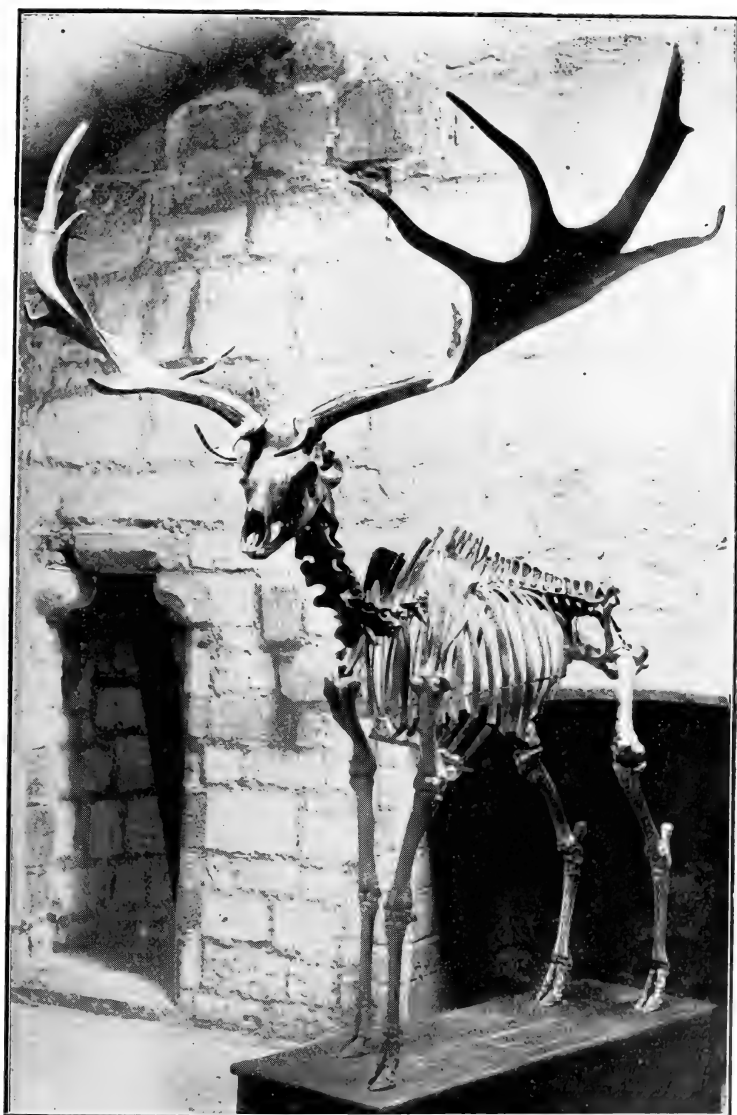
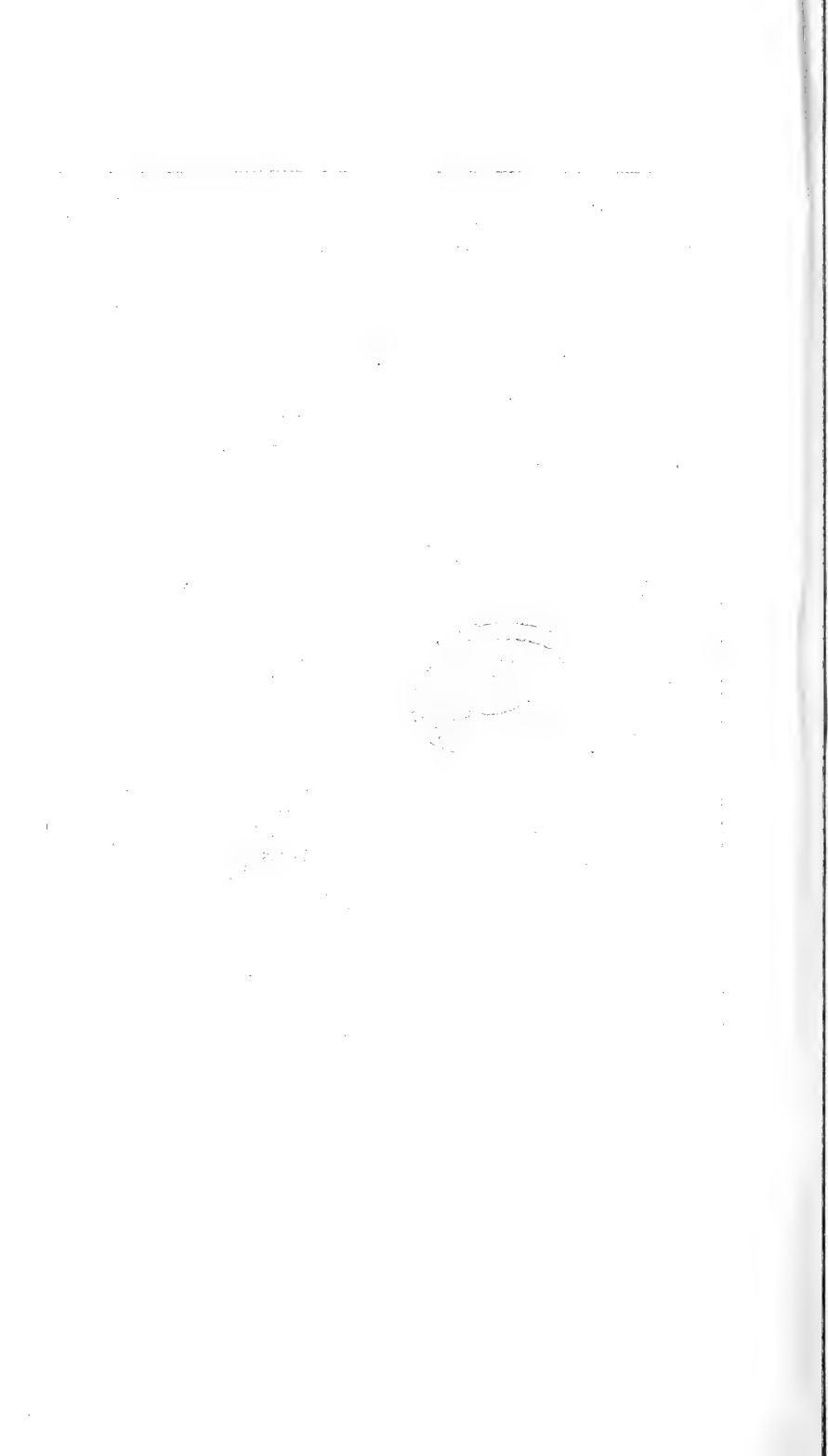


Photo by

[G. B. C. 1905]

Skeleton of Irish Elk from Close-y-garey, St. John's.





Two Views of a Small Urn, from Cronk Aust, Isle of Man.

1897, with the co-operation of a committee appointed by the British Association. The original is in the Insular Museum now temporarily located in Castle Rushen. The second illustration (Plate XIV.) shows two views of a curiously-shaped and decorated small urn, found in a barrow at Cronk Aust. It measures $4\frac{1}{2}$ inches in height by $6\frac{1}{2}$ inches in greatest diameter. It contained cremated bones. The third illustration (p. 190) gives a representation of a number of pre-historic bronze implements, etc., found in the island. These consist of plain and socketed celts, palstaves, swords, dagger and spear heads, and sickles. Comparatively speaking, however, only a few loose bronze objects have been discovered.

Relating to another branch of Manx archæology, Mr. Kermode has written a paper dealing with 'Traces of the Norse Mythology in the Isle of Man.'* The evidences are largely derived from the carvings on the old crosses, several fine examples of which are figured in the pamphlet. Upon these stones of the twelfth and thirteenth centuries the author has found and described scenes and stories from the Viking faith. His story is a fascinating one, and contains much matter for the consideration of any student of antiquities and folk lore.

'One and All' Gardening, 1905. Edited by **Edwd. Owen Greening, F.R.H.S.** London: The Agricultural and Horticultural Association, Ltd.

This popular annual attains its tenth issue with the present number. Its size is undiminished, comprising 200 pages of interesting matter, illustrated with about 150 photo-engravings and woodcuts. There are about 40 original articles by capable writers. The first edition printed is 100,000 copies. The price remains at the popular charge of twopence, bringing the annual easily within the reach of all garden owners of every class.

Fireside Astronomy. D. W. Horner. Witherby & Co. London. 1s. 6d. net.

We regret we cannot report favourably on this little book. It is not cheap compared with some other astronomical works 'for the general reader'; the author has not the happiest of ways of making the subject plain—in parts he is inaccurate, and the illustrations are vile.

Mr. Benjamin Harrison, of Igtham, Kent, who has done so much work in connection with the earliest evidences of man's handiwork in Britain—viz., the Eolithic Flint Implements—has issued a useful pamphlet entitled, 'An Outline of the History of the Eolithic Flint Implements' (6d.). The author describes the various types of implements he has discovered during the past fifty years, and gives an outline of the theory advanced respecting their origin. The pamphlet is illustrated.

* London: Bemrose & Sons, Ltd.; 30 pp. and 10 plates. Price 2s. 6d.

NORTHERN NEWS.

An earthquake was distinctly felt in many parts of Yorkshire early on Sunday morning, 23rd April.

Mr. A. Deane, of the Warrington Museum, has been appointed curator of the Public Museum, Belfast.

Mr. T. W. Woodhead, of Huddersfield, has left England for Zurich and will probably remain abroad about fifteen months. His object is to make investigations on the ecology of the flora of the Alps with Prof. C. Schröter.

Miss Jessie L. M. Bird, of 4, Riversdale Road, Aigburth, Liverpool, is the secretary of the section of the Liverpool Kyrle Society organised for the distribution of flowers to elementary schools in poor districts, to be used for decorative and educational purposes. The society appears to be doing good work.

The Bradford Scientific Association has a number of 'Sectional Committees,' each of which has set itself certain problems to solve. Under the head of 'Anthropology' we notice that 'The Yorkshireman in particular will be analysed, dissected [!], and studied in all the many phases which he exhibits to an admiring world.'

It is pleasant to notice that articles on natural history subjects are becoming much more frequent in our daily and weekly newspapers, as well as in the monthly periodicals. We have recently received several issues of the 'Morning Leader,' in which illustrated articles dealing with bird life, etc., occupy a prominent place.

'On Some Early Dutch and English Decoys' is the title of an interesting paper by Mr. Thos. Southwell, F.Z.S., in the 'Transactions of the Norfolk and Norwich Naturalists' Society,' recently issued. The same publication contains Mr. Arthur Bennett's valuable notes 'On *Carex paradoxa* and *Lastrea cristata* in Britain.'

There has been an outcry at Filey on account of the Lord of the Manor removing vast quantities of stone from Filey Brig for the purpose of road making on a new building estate which he is developing. Cartloads of stone have been broken from the ridges and carried away. Such a procedure is certainly calculated to assist the sea in its work on the east coast.

The boring tool lost in the boring at Lincoln in November 1903, at a depth of 860 feet, has now been recovered by sinking a shaft 9 feet wide to a depth of 862 feet. The boring will eventually reach to a depth of 2,000 feet, and will be the deepest in the United Kingdom. It is to be hoped that the water supply of Lincoln will then be of a more satisfactory character than the present one.

Mr. Robert Service, of Dumfries, reprints from the Transactions of the Natural History Society of Glasgow a paper on 'The Sylviidæ of Solway,' or, as he prefers to call them, the warblers of the Solway. His paper contains copious notes on the following nine species:—Whitethroat, Garden Warbler, Lesser Whitethroat, Blackcap, Wood Warbler, Willow Warbler, Chiffchaff, Sedge Warbler, and Grasshopper Warbler.

At a meeting of the Geological Society of London, some little time ago, Mr. E. T. Newton, F.R.S., exhibited a specimen of *Fayolia* near to *Fayolia grandis*, found by Dr. L. Moysey, of Nottingham, in the Coal Measures of Ilkeston (Derbyshire). He pointed out that *Fayolia* was first described by Profs. Renault and Zeiller in 1834, in their monograph on the 'Houiller de Commeny.' In August 1894, Mr. Seward described the first British specimen, from Northumberland, in 'The Naturalist,' but thought that it was not a plant. There was some resemblance to certain spiral egg-cases of Elasmobranchs; but Dr. Günther was unwilling to accept the Northumberland fossil as the egg-case of a fish. There is still uncertainty as to the exact nature of this fossil.

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NOTES AND COMMENTS.

MR. G. W. LAMPLUGH, F.R.S.

It is with every pleasure that we sincerely congratulate the President of the Yorkshire Naturalists' Union, Mr. G. W. Lamplugh, of H.M. Geological Survey, on his recent election as a Fellow of the Royal Society. Mr. Lamplugh's thoroughness in his geological work has long been known. In 1891 (the year following that of his election as a Fellow of the Geological Society) he received an award from the Lyell Geological Fund in recognition of his excellent work amongst the glacial deposits of the Bridlington and Flamborough area, where he commenced his work 'as a coastguard in the service of science.' His later papers on the Lower Cretaceous rocks of Yorkshire and Lincolnshire are amongst the finest pieces of work of their kind in our language. Soon after his appointment on the staff of the Geological Survey Mr. Lamplugh undertook the surveying of the Isle of Man, which resulted in a map of the island, and a memoir and several papers, the far-reaching nature of which is astonishing, having regard to the short time he had for the work. In 1901 the Geological Society awarded him the Bigsby Medal. Whilst his official duties call him away from his native county, all Yorkshiremen wish him a long and successful career, and hope for the pleasure of an occasional ramble with him on his native soil in years to come.

YORKSHIRE SPIDERS.

The Rev. O. Pickard-Cambridge, of Bloxworth Rectory, Wareham, has undertaken to finish the 'List of Spiders' of Yorkshire for the Victoria History, and asks for assistance from Yorkshire naturalists. He has received several species from the neighbourhood of Huddersfield, but requires records from other parts of Yorkshire, and especially from the sea coast. All that is necessary for the collector to do is to bottle in spirits of wine whatever he meets with, otherwise, unless he is a specialist, he will most likely reject what he should keep. Localities, such as 'marsh,' 'woodland,' 'sea-shore,' etc., should be noted. Coleopterists and other insect collectors are particularly requested to help. Mr. Pickard-Cambridge would gladly name any specimens sent, and the editors of this journal would be happy to receive particulars of any important species secured.

LINCOLNSHIRE WATER SUPPLY.*

The Geological Survey has issued a useful Memoir dealing with 'The Water Supply of Lincolnshire from Underground Sources,' this being the third of the county memoirs dealing specially with water supply. Of the 229 pages comprising the monograph, 164 are occupied by details of borings in various parts of the county. In connection with these it should be pointed out that, although the work is intended to act as a geological guide for the water-bearing strata of Lincolnshire, it has been deemed advisable to include all borings made in Lincolnshire for whatever purpose. Naturally, details of many of these have been previously published. It is nevertheless very useful to have them in this compact form, as, quite apart from questions of water supply, details of borings are always of service to geologists, and can be turned to account in a variety of ways. The list of borings is arranged in alphabetical order, according to locality, and has been prepared under the editorship of Mr. H. B. Woodward. Messrs. W. Whitaker, H. F. Parsons, and Henry Preston have contributed much information, and Dr. H. R. Mill writes on 'The Rainfall of Lincolnshire' (with map). Mr. H. B. Woodward's 'Outline of the Geology as far as relates to Water Supply' is a most useful summary.

INTERNATIONAL ORNITHOLOGICAL CONGRESS.

The fourth International Ornithological Congress was held in England, the headquarters being London, from 12th to 17th June, under the presidency of Dr. R. Bowdler Sharpe. This was followed by a number of excursions, that on Wednesday, the 21st, being to Speeton and Bempton Cliffs. At this the Yorkshire Naturalists' Union was represented by its Secretary, on the invitation of the Secretaries of the Congress, whilst Messrs. T. H. Nelson and T. Boynton assisted in making the local arrangements. Mr. Nelson had also written a pamphlet on 'Cliff-climbing at Bempton,' which was distributed amongst those present. A party of over fifty drove to Bempton by wagonette from Bridlington, where they viewed the climbing and obtained a great number of eggs.

THE 'COLLECTING' FARCE.

Fortunately for the reputation of English collectors (though unfortunately from the point of view of providing entertainment

* Published by E. Stanford, 12-14, Long Acre. 4s. 6d.

for the foreign savants) the operations of the 'enthusiastic' collectors were suspended for two or three hours, at any rate on that portion of the headland visited by the Congress. This was evidently a special concession in favour of the Congress. It was certainly very refreshing to be able to approach the 'climber' as he ascended the cliff, and see him gathering, without having to cut the 'catch as catch can' capers so familiar nowadays on the Bempton Cliffs. The great attraction at Bempton now is not the cliffs and the 'climber' but the antics of those who eagerly await his arrival over the cliff edge, and their efforts to secure the 'good' eggs. The danger of 'climbing' is not now in falling blocks of chalk, nor in possible flaws in the rope, but in the possibility of being pushed backward over the cliff by the collectors, who, like the jackdaws on the cliff face, make a dash for the eggs, and secure them amidst many caws and chatterings. Surely some mutually advantageous arrangement might be made between the 'climbers,' naturalists, collectors, and dealers to prevent this state of things.

EARTH-SHAKES.

In a paper 'On Earth-shakes in Mining Districts' ('Geological Magazine,' May), Dr. C. Davison gives a diagram of the Barnsley earth-shake which took place on 23rd October 1903. He concludes that 'Earth-shakes in mining districts are produced by small fault-slips precipitated by the removal of the coal from the immediate neighbourhood of the fault, or partly, perhaps, by the lowering of the water in that region by pumping in other parts of the mine. In either case the earth-shakes would owe their origin to operations of nature, aided very effectively by those of man.'

BIRDS.

The Grey Wagtail in Lincolnshire.—On the afternoon of the 10th June I saw a pair of *Motacilla melanope* Pallas on Cadney Beck, and on Whit-Sunday another pair on a little stream which flows into Kettleby Beck. The last nest I saw was some years ago, by the late John Cordeaux's study window at Great Cotes. From 1873 to 1878 it was not uncommon on Bottesford Beck, but has not been seen of late years, and will not be again, as the once beautiful beck is nothing but a foul sewer from the big villages which have sprung up round the Frodingham Ironworks.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, 12th June 1905.

THE CONCEALED COALFIELDS OF YORKSHIRE, DERBYSHIRE, AND NOTTINGHAMSHIRE.*

PROF. P. F. KENDALL, F.G.S.

THE first question put to me for answer is the following :—

1. Is there any reason for reducing the area of the concealed coalfield as estimated by the last Royal Commission? †

To this I answer—No, but on the contrary, there are positive proofs of its extension beyond the limits then assigned.

2. What portion of the concealed coalfield has since been so far explored as to have passed from the unproved to the proved, and to be included within the returns of the district commissioners?

Great developments have taken place on the western side of the concealed area and large pits are now in operation beneath the Permian rocks and some even beneath the Trias. Extensions of the field in a southerly and easterly direction have also been definitely established and the seams proved by bore-holes at Ruddington and Edwalton, and South Scarle, in Nottinghamshire, at Haxey (South Car) in Lincolnshire, and at West Bank in Yorkshire.

The area which has been regarded as proved by these works I have estimated at 570 square miles, and deducting this from the 900 square miles of the early estimate, there remains 330 square miles of the area still unproved.

3. How far is it necessary to modify the estimate of the amount of available coal in this unproved portion in the light of present knowledge as to the depth at which the Coal Measure lies and the thickness and distribution of the seams?

It is impossible to give a categorical answer to this question, as the 1871 estimate was couched in such general terms that it is impracticable to determine to which part of the concealed area a particular estimate applies, and therefore to say whether the basis of calculation has or has not been satisfied. Moreover, no map upon an adequate scale or with a definite boundary accompanied this part of the report.

* Summary reprinted from the Final Report of the Royal Commission on Coal Supplies. Part IX. Report of the Geological Committee upon the Resources of the Concealed and Unproved Coalfields of the United Kingdom. London (Blue Book). 1905. By permission of the Controller of H.M. Stationery Office.

† In 1871.

The area was divided in 1871 into a tract of 672 square miles, which was estimated to contain an average thickness of forty feet of coal at a workable depth and another tract of 232 square miles computed to yield twenty feet of available coal.

No attempt was made to delimit these two regions, and it is therefore impossible to say from which one the now proved area should be deducted. It is, however, probable that the estimate of thickness erred considerably on the side of excess.

4. What grounds, if any, are there for extending the limits of the concealed coalfield?

The many borings and sinkings which have been put down, chiefly for water, but partly in search for coal or other mineral, in the country between the visible coalfield and the East Coast have made it quite apparent that the concealed portion has a much wider extension than the most sanguine estimate of 1871 admitted.

New methods of inquiry have also been devised or old ones extended and systematised, and these have provided a more scientific plan upon which to proceed than the entirely empirical basis of the earlier calculations regarding this coalfield.

The borings and sinkings have furnished the data for approximate determination of the thickness of each rock formation covering the Carboniferous rocks in the area, and several have pierced to the Coal Measure or older rocks, giving precise information in such cases.

The York, Derby, and Nottingham coalfield lies in a basin-fold, of which the western edge and a small portion of the northern margin are exposed, the remainder of the basin and its edges are concealed beneath a discordant sheet of newer rocks, steadily increasing in thickness to the eastward by the successive on-coming of layer upon layer of eastwardly dipping beds.

The problem which has to be solved is the determination of the place and mode of uprise of the other edges of the coal-basin, beneath a mantle of newer rocks, hundreds or perhaps thousands of feet in thickness.

The method adopted by the late Prof. Green in his evidence to the last Commission was to assume that the axis of the trough coincided with the position of the highest normal Coal Measure rocks in the visible field and to draw an ellipse symmetrically about the edge of the elongated area in which they had been proved.

This, I believe to be the foundation for the boundary adopted by the Commission.

Prof. Hull drew two lines upon the map which he presented, one defining the area within which the Coal Measures would be found within 2,000 feet of the surface, and an outer one marking what he supposed to be the actual limits of the basin. In his verbal evidence, however, Prof. Hull considerably enlarged his boundaries and expressed the opinion that Coal Measures would be found at a depth of 4,000 feet 'as far east as the escarpment of the chalk at the Humber.' This more optimistic view is closely accordant with my own.

The principle which has been my guide throughout this inquiry is that which is chiefly associated in this country with the name of Mr. Godwin Austen, whose great services to the last Coal Commission are well known.

Mr. Godwin Austen argued that every undulation of the strata whether trough-fold (syncline) or ridge-fold (anticline) was based vertically upon, and was a repetition of a fold which had affected older underlying rocks before the deposition of the super-incumbent strata; and that, too, despite any levelling off to which the older rocks were subjected to atmospheric or marine agents prior to the deposition of the later series.

Without committing myself to a plenary and unqualified acceptance of this doctrine I am quite prepared to admit its general applicability, especially as in two cases, at least, I have found evidence on the borders of the York, Derby, and Nottingham Coalfield of a more convincing character than Godwin Austen was able to adduce.

The evidence of repetition of folding ('posthumous folding' of Suess) may take the form not merely of an arching of the rocks after deposition, but may manifest itself by the thinning of beds as they approach the axis of the fold, and by planes of erosion within the limits of a formation as well as by actual gaps in the succession of the beds. Moreover, while some axes of unrest present evidences of movements repeated again and again through many successive periods, others exhibit unmistakable signs of the renewal of the folding movement after long intervals of quiescence, or perhaps even of movements of the opposite sign; thus, in the last case, a fold of the arch type (anticline) may at some subsequent geological period sag downward and receive a quite abnormal amount of deposition, and later still may renew its arch-structure by the bending of the newer rocks.

A study of the country bounding the York, Derby, and Nottingham Coalfield reveals three great posthumous folds, all of which (whatever their previous history) moved powerfully and with decisive effect, after the deposition of the Coal Measures and before the Permian rocks were laid down.

As the arches rose the crests were worn off and the Permian rocks were deposited on the eroded plane, sometimes thinning off against the flanks of the ridge, as was the case with the Pennine arch and the Charnian fold, in other cases extending quite across the eroded arch as in the case of the very complex and disturbed region between the Yorkshire Coalfield and that of Durham.

THE BOUNDARIES OF THE COALFIELD.

The boundaries which I have drawn on the map accompanying this report are traced in each instance in relation to some considerable anticlinal fold—those on the north and the south-west are so patent and the Coal Measure so clearly extend up to their margins so far as they can be followed, that I feel a considerable degree of confidence in their validity. On the east the evidence is not nearly so complete, but I have drawn the line at the *first* anticlinal fold, indeed the only one between the coalfield and the sea, and have found corroboration in evidence of an entirely different character. The most doubtful boundary is that on the south-east.

The prolongation of the south-western boundary is so clearly marked right down to the belt of Cretaceous rocks near Cambridge that only a desire to err a little on the side of under-estimation induces me to draw a boundary short of the point where the Charnian fold would become merged in the great plateau of ancient rocks which underlies the London Basin. I have studied with the utmost care the structure of the country from Nottingham to Cambridge in search of any indications of an anticlinal fold or any considerable disturbance which might mark a limit to the coalfield in that direction, but without success.

A small and very low anticline runs at right angles to the Charnian axis in Buckinghamshire, but it cannot be traced into the Fen country with any degree of confidence, and even if it could it is upon so small a scale that it might well be doubted if it marked an actual interruption to the extension of a coal-basin, rather than a minor roll in the strata similar to that

which is observed between Shirebrook and Cresswell on the borders of Derbyshire and Nottingham.

It will be convenient that I should give a short summary of the evidence for each of the boundaries.

The Western Boundary.—This is the very obvious anticlinal fold of the Pennine Chain. Of its early history we have no record, but the close similarity between the Coal Measures of the opposite sides of the chain, the resemblance extending even to small details between some of the seams in the eastern and



western fields, and the continuity of the Lower Carboniferous rocks are perfectly decisive proofs, often ignored, of the former continuity of the Coal Measures over the Pennine area. The first arching movement of which we have any geological record took place after the Coal Measures were laid down, the ridge rose, and though much wasted and worn down by the weather, it remained as a low barrier separating the Permian sea or lake that washed its eastern slopes from another watery area on the west. Of its subsequent movements we know but little; it is,

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however, clear that another arching took place at some time after the Permian (Magnesian Limestone) rocks were deposited, for those rocks have now a dip or inclination away from the Pennines on the east, as their equivalents have on the west.

This movement probably did not take place all at one geological period, but was renewed again and again, the last movement being attested by the easterly dip of the chalk in Lincolnshire and Yorkshire.

The South-Western Boundary.—In the neighbourhood of Nottingham the general dip of the Coal Measures swings round from an easterly to a north-easterly direction as the beds disappear beneath a discordant cover of Triassic rocks. In other words they *rise* towards the south-west. The strike or level-line of certain seams has been determined to be in agreement with this.

These are the significant indications of the rise of one edge of the basin against a barrier of older rocks, and though the actual rim is not visible, its position can be defined with certainty to within a few miles, for at a very short distance to the south-west the Triassic rocks can be seen upon the very ancient rocks of Charnwood. The Charnwood tract is composed of a complex group of very ancient rocks bent long before the Carboniferous period into a general anticline running from about north-west to south-east. Repetition of folding upon the same axis rolled up the Carboniferous rocks and formed a barrier to which the striking differences between the Permian rocks of Leicestershire and those of Nottinghamshire are probably due.

(*To be continued.*)

ENTOMOLOGY.

Lincolnshire Entomology.—At the recent meeting of the Lincolnshire Naturalists' Union held at Louth, two larvæ of *Sesia asiliformis* (= *cynipiformis*) were taken from an oak stump, and from the poplars larvæ of *Tæniocampa populeti* were obtained.—G. W. MASON, Barton-on-Humber.

It is very difficult for the ordinary farm labourer to comprehend the aims of field geologists who from time to time visit his country side. We have heard of our friends of the hammer being mistaken for burglars, bill-stickers, and even anglers, but the following incident from the East Riding shows that the rustic imagination is still unexhausted in this direction. A friend of ours, wishing to overtake a party of geologists, asked a farm labourer if he had seen them pass along. 'Why, Ah deeant knaw,' he said, 'but Ah did see sum chaps uppod rooad; nobbut Ah deeant think 'at they wer g'ologists 'cos they'd ties an' collars on!'

NOTE ON THE OCCURRENCE OF *ACTINOCAMAX PLENUS* IN THE CHALK OF YORKSHIRE.

C. THOMPSON.

Hull.

EVERY geologist knows that *Actinocamax plenus* is the characteristic fossil of the narrow zone at the top of the Lower Chalk. Every Yorkshire enthusiast knows full well how many a fruitless search has been made to obtain a specimen in his county.

Mr. Sheppard records this failure in his most interesting and useful little book—'Geological Rambles in East Yorkshire'—in these words:—'This fossil occurs in fair numbers in the Black Band of Lincolnshire and other counties, several specimens having been obtained in the quarries at Louth, and even in those at Barton, on the south Humber shore, but hitherto not a single specimen has been obtained north of the Humber.'

On Saturday, 13th May, while searching for chalk fossils in the 'Graystones' pit (according to the Ordnance Survey), known locally as the 'Melton Bottoms' pit, which is situated in Swanland Dale, a little to the north of Melton, and $7\frac{3}{4}$ miles west of Hull, I was so fortunate as to find a fairly large fragment of a belemnitoid, which I at once suspected to be a young 'plenus,' for it both resembled the Barton specimens in state of preservation and was found in situ.

Dr. A. Rowe, of Margate, to whom the specimen was submitted for identification, gave the opinion that there could be no reasonable doubt that it was a fragment of a young 'plenus,' and noted the find as the first in Yorkshire.

During an excursion of the members of the Hull Geological Society, on 27th May, the 'Graystones' pit was visited and again thoroughly searched, when Dr. Walton, of Hull, found a better specimen which was dug out in my presence. This was most gratifying, for not only does it confirm my own find, but also shows that now the veil is lifted, other specimens will soon be recorded.

As I have now seen three specimens in situ, I may be pardoned if I give their exact positions to serve as a guide to other workers. Forming the base of the Black Band, both at Barton and in the 'Graystones' pit, there is a layer of yellowish

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crumbly marl, about 2 inches thick, resting on a layer of rubbly chalk, a few inches in thickness. My 'Graystones' specimen was slightly embedded in the top surface of the chalk, while my Barton specimen was lying on the chalk, and therefore really in the Black Band. Dr. Walton's find was clearly surrounded by the yellowish marl and about 1 inch from the surface of the chalk. Therefore, all three were, roughly speaking (not taking into account the physical meaning of the marl), found on the same line or horizon. There is a record of one being found at Barton in the higher part of the Black Band.

It will be gathered from the above, that though the Yorkshire Chalk keeps its secrets too well, yet with plenty of work and a good stock of patience it may be made to yield some very interesting and geologically important results.

The pit in which these belemnites were found is that visited by the Yorkshire Naturalists' Union in 1901, a photograph of which appears in 'The Naturalist,' July 1901, page 221. Both the belemnites were found in the Chalk behind the tree in the left foreground.



THE LINCOLNSHIRE OXLIP.

REV. E. A. WOODRUFFE PEACOCK, F.L.S., F.G.S.,

President of the Lincolnshire Naturalists' Union.

THE species called *Primula veris* by Linnæus has always interested me, and during the last twenty years I have studied its forms carefully. Under this general name two common plants, the Primrose (*acaulis* Linn.) and the Cowslip (*officinalis* Linn.), and the much rarer Oxlip (*elatior* Linn.), are classed as sub-species. As there is some doubt as to whether Linnæus' plant was the true Oxlip or the hybrid *acaulis* × *officinalis*, the sub-species is now called *P. elatior* Jacquin, for there is no question what plant is referred to by that name. It is found in England on one soil only, the Chalky Boulder Clay; and is confined to a limited area in the counties of Essex, Suffolk, Cambridge, and Bedford. Elsewhere it is either an escape from cultivation—a thing I have never heard of—or confounded with the hybrids or sub-hybrids of the Primrose and Cowslip. The hybrids and sub-hybrids may be summarised as follows:—(1) The hybrid *acaulis* × *officinalis*, where the former is the seed bearer from which the hybrid spring. (2) The opposite hybrid, *officinalis* × *acaulis*. (3) Either of these varieties crossed with

either parent. In the field I have only found the sub-hybrid (*acaulis* \times *officinalis*) \times *acaulis*, but have obtained (*officinalis* \times *acaulis*) \times *officinalis* by natural bee crossing. The other sub-hybrids (*acaulis* \times *officinalis*) \times *officinalis*, and (*officinalis* \times *acaulis*) \times *acaulis*, have only been obtained by hand in the garden. (4) A form which is generally classed as a variety of *P. acaulis* and called *caulescens* Koch.

We will now attempt to consider these so-called Oxlips in order :—(1) and (2) are very often, perhaps I might write nearly always, found where *acaulis* grows near *officinalis*; and can be easily produced by growing them in proximity in a garden. If, however, their natural localities are carefully analysed, certain facts come to the front. In fairly open woods, or on bushy banks or hedge-sides, the hybrid is (1) and 'favours' the Primrose. On the other hand, in open meadows and poor pastures the hybrid is (2), and 'favours' the Cowslip. So certain is this rule that I have only found one natural exception in over two score of cases. The circumstances were peculiar. The hybrid was found in an orchard where both parent species then grew. It was nearest the Cowslip in position, but 'favoured' the Primrose in form, and there can be no doubt it was hybrid (1). The sub-hybrid (3), as far as my observations are concerned, is confined to open woods, where the Primrose grows with hybrid (1). I have never found it in the open. This is not wonderful, for hybrid (2) is rare. The (4) form, which is called *caulescens* Koch, may only be a variety of *P. acaulis*, but I have every reason to believe it is *P. acaulis* crossed again with sub-hybrid (3), or [(*acaulis* \times *officinalis*) \times *acaulis*] \times *acaulis*, that is a form in which *acaulis* has always been the seed-producing plant for hybrid which is one-eighth part of *officinalis* origin. In the field or experimental ground it is simply a common Primrose in which the underground flower stalk has lengthened into a shorter or longer stalk, carrying a straggling umbel of flowers. It is the parent form of the Polyanthus of our gardens. Single plants may rarely be found with typical and *caulescens* flowers. It may be nothing but a mere variety of *P. acaulis*, but certain matters seem to tell against that view. It is curious I have only taken it where the hybrid (1) or sub-hybrid (3) grow with both parent forms. I have also found 'pin-eyed and thumb-eyed' flowers on the same *caulescens* umbel. I never remember doing this on one root of the typical Primrose, though it is not uncommon on garden Polyanthus. Some years ago in Mamby woods a large clearing of timber

was made. Three years later on one spot in this opening an endless variety of hybrids, both (1) and (3) were discovered, along with (4). Under similar circumstances I have found all the forms except (2) elsewhere. At both Bottesford and Cadney I have grown the true *P. elatior* Jacq., beside *acaulis* and *officinalis*. The result in both cases was an interminable series of hybrids, like (1), (2), (3), and (4) (though the last was very rare), which will defy anyone to name unless they knew their origin.

As a simple matter of fact, the three plants, called the Primrose, Cowslip, and Oxlip, which from local choice of habitat are like distinct species, when brought together in close proximity in nature or by art are confluent like the named *Rubi* and *Salices*. They are so given to crossing and recrossing that they can hardly yet be called 'species' in the modern sense of that word. Without an inkling of our evolutionary theories and terminology to aid him, the acute mind of Linnæus grasped all the facts which could be observed over 150 years ago, and classed the three plants as varieties of one species. With this definition I see no reason to disagree, unless it is to add a matter of direct observation. The Primrose, Cowslip, and true Oxlip are environment species, or 'species in the making,' *in posse* not *in esse* yet. This is plainly seen, because their hybrids or sub-hybrids (1), (2), and (3) are much more impermanent than the parent sub-species. Every wild Lincolnshire Oxlip I have seen has been of hybrid origin, and has soon disappeared from its native locality. Jacquin's plant is not found with us excepting in gardens; it is rare even in cultivation.

BIRDS.

Water Ouzel in North Lincolnshire.—While walking on June 9th with my brother, the Vicar of Cadney, Lincolnshire, on the north bank of the beck which divides Cadney from North Kelsey, I observed a Water Ouzel hurriedly running across the floor of the stream and hide itself among the grass of the south bank. Though the water was very shallow at the time, the bird, with the exception of its head, was covered with it. Has *Cinclus aquaticus* been recorded before in North Lincolnshire?—JULIAN E. O. W. PEACOCK, Manchester.

[Very rare according to Cordeaux's book and pamphlet on 'Humber Birds.' Perhaps a wounded or injured bird. The only summer record is on Hallington Beck, near Louth.—EDS.]

LINCOLNSHIRE BOULDERS.

ARTHUR SMITH, F.L.S., F.E.S.,

Grimsby.

MR. C. B. PARKER, of Irby, has placed in the Grimsby Museum a collection of chippings from boulders in his district. Many of the boulders have been taken to the farmstead, and by such means their preservation is assured. I believe all those in the following list are now in or near the farm garden, and the two boulders recently recorded, one of which is of Carrock Fell Gabbro and the first record for the county, are now with them, having been removed from the site on which they were discovered. Duplicate chippings have been sent to Mr. C. S. Carter, of Louth, who is interesting himself in the boulders of the county and desires chips from any Lincolnshire boulder with authentic measurements and position. The numbers do not run consecutively, and, to avoid any confusion by re-numbering, I give them as they have come to hand. Mr. T. Sheppard, of Hull, kindly went through them and named the rocks for Mr. Parker.

	in.	in.	in.		in.	in.	in.
1. Basalt ...	...	18	15	6	20. Schist, decomposed	8	8
2. Quartzite ...	...	9	8	6	22. Augite Syenite ...	10	8
3. Basalt ...	...	9	6	6	25. Granite (foreign) ...	14	12
4. Sandstone (Oolitic, with specks of iron) ...	...	7	6	5	26. Horneblende Schist, very fine ...	12	12
5. Quartz Porphyry, like Armboth Dyke, Lake District... ..	...	9	6	5	27. Secondary Sand- stone ...	...	9
6. Carboniferous Lime- stone, weathered	10	6	4	4	28. Basalt ...	...	12
7. Carboniferous Sand- stone ...	...	9	8	4	29. Basalt ...	...	9
8. Limestone, weathered	11	6	5	5	30. Basalt ...	...	14
9. Basalt ...	...	12	7	6	31. Basalt ? ...	...	16
12. Oolitic Limestone ...	...	15	12	8	32. Sandstone, Carbon- iferous ? ...	...	12
14. Basalt ...	...	16	15	9	33. Andesite (?) ...	...	9
16. Basalt ...	...	16	9	8	34. Basalt ...	...	11
18. Schist, with quartz...	...	21	12	6	35. Quartzite ...	...	24
19. Sandstone, fine ...	...	15	6	6	36. Sandstone ...	...	23
					37. Granite, with much quartz ...	...	16
					38. Basalt ...	...	19
					39. Granite ...	...	14
					42. Rhomb Porphyry ...	...	16

We regret to learn that the 'Field Naturalists' Quarterly' has shared the fate of those other excellent natural history journals, 'Natural Science' and 'Science Gossip,' and has been discontinued.

Naturalist,

NOTES ON BIRDS OF THE EDEN VALLEY.

HARRY BRITTEN.

Salkeld Dykes.

THE district covered by these notes extends from the confluence of the Eamont and Eden to Armathwaite Bridge, enclosing a strip of country about a mile wide on either side of the river. My personal observations in the district cover a period of about twenty years.

MISTLE-THRUSH. This bird is common as a breeding species in the Eden Valley.

SONG-THRUSH. This fine songster is abundant in the Eden Valley, and is in the habit of placing its nest in very singular positions. I find nests regularly in cattle sheds, placed on the walls or beams, also in holes in stone walls; whilst on one occasion I found a nest placed under a tuft of grass on the ground. The nests had not been built in these situations for lack of suitable trees and bushes as nesting sites, for in two different cattle sheds placed alongside woods the Thrush nests annually, and the nest found on the ground was in a wood, where there were plenty of young Scotch and spruce fir trees.

REDWING, BLACKBIRD, RING-OUSEL, WHEATEAR, WHINCHAT, REDSTART, REDBREAST, and WHITETHROAT are plentiful; the Ring-Ousel only on migration.

STONECHAT. I have only seen this bird on migration in the Eden Valley.

BLACKCAP. I have never found this bird nesting in this portion of the Eden Valley, and have only seen it very rarely on its first arrival in spring.

GARDEN WARBLER. This fine songster is very variable in its appearance, some seasons being abundant, whilst in other years not a single bird is either seen or heard.

WILLOW WARBLER. This bird is abundant as a summer visitant, nesting throughout the Eden Valley. When I was a boy in Bedfordshire, this bird was known to us as a 'bank-bottle,' from its dome-shaped nest being so often found on the banks of hedges and ditches.

GOLDCREST, SEDGE-WARBLER, HEDGE-SPARROW, DIPPER, LONG-TAILED TIT, GREAT TIT, COAL TIT, MARSH TIT, BLUE TIT are common.

NUTHATCH. The late Rev. H. A. Macpherson, in the 'Victoria History,' says:—'A pair of Nuthatches were shot at Armathwaite in 1782.' I know of no recent records.

WREN, TREE CREEPER, PIED WAGTAIL, and GREY WAGTAIL are common.

YELLOW WAGTAIL. I have only seen this bird as an occasional visitant to the Eden Valley, but in the autumn of 1904 I came across a family party feeding amongst some cattle in a pasture near the river-side.

PIED FLYCATCHER. This very interesting species is found as a breeding bird at Edenhall, and also in Baron Wood. I have seen occasional birds at other parts of this district, but have no trace of their nesting.

TREE PIPIT, MEADOW PIPIT, SPOTTED FLYCATCHER, SWALLOW, HOUSE MARTIN, SAND MARTIN, and GREENFINCH are abundant.

HAWFINCH. This bird has only occurred here on one occasion. This was in 1903, when a family party appeared in the gardens at Nunwick Hall, living there for several weeks on the rows of peas. They destroyed large quantities of this vegetable, ripping open the pods with their powerful bills and extracting the peas. At this time I also had records from several of the neighbouring villages of a 'big nebbed' bird that was eating the peas.

GOLDFINCH. This bird used to breed in the Eden Valley in large numbers, but during recent years it has become very scarce, though it still breeds in one or two favourite spots. A bird caught in this district lived as a cage bird for 15 years, and was then accidentally killed.

SISKIN. This has only occurred in this district as a winter visitant.

HOUSE SPARROW and **CHAFFINCH** are abundant, whilst the **LINNET**, **LESSER REDPOLL**, and **BULLFINCH** occur in limited numbers.

CROSSBILL. I have no actual record of this species in the district under consideration, but numbers have occurred on both sides, and I have no doubt have also appeared in this area. A small flock of Crossbills lived in a larch wood near Little Salkeld during the winter of 1903-4, remaining until late on in the spring. A male bird was shot by J. Davidson, Langwathby.

CORN BUNTING, **YELLOW HAMMER**, and **REED BUNTING** are fairly common, and the **STARLING** is abundant.

SNOW-BUNTING. The only occasion on which I have seen this bird in the Eden Valley was during the winter of 1896, when a large flock passed close past me, as if they were on their way to the eastern fells.

JAY. This bird is not common in the Eden Valley, but is found fairly regularly at one or two favourite localities.

The **MAGPIE** is becoming very scarce in the Eden Valley, though formerly abundant.

JACKDAW. This bird nests in hundreds in Baron Wood, and smaller colonies exist on the banks of the Eden and also in quarries throughout this district. The late Rev. H. A. Macpherson, in the 'Victoria History,' says, 'a pure white Jackdaw was shot some years since near Little Salkeld.'

RAVEN. Is only known to us by the birds passing to and fro between the eastern and western fells.

CARRION CROW. This bird is only too common as a resident in the Eden Valley, being very destructive to the eggs of game birds; it also visits the farmyards in the early morning in search of any eggs that may be lying about, and will even take young chickens and ducks as they run about the farmyard.

HOODED CROW. Is only very rarely met with in the Eden Valley.

The **ROOK** is a pest, the **SKYLARK** is very plentiful.

SWIFT. This bird breeds in nearly every village in this district; five or six pairs nest annually in the roof of my house.

NIGHTJAR. Is moderately common in the Eden Valley, but I have never been able to find a nest.

GREEN WOODPECKER. This bird is a rare visitor to this district; the only records which I possess refer to a pair seen during the winter of 1902-3, and a single bird seen during the present winter. The late Rev. H. A. Macpherson, in the 'Victoria History,' says:—'A pair are believed to have nested in Baron Wood.'

GREAT SPOTTED WOODPECKER. A few of these birds are seen almost every winter, and, I believe, are supposed to nest at Edenhall at the present time.

LESSER SPOTTED WOODPECKER. The only record I can find of this bird is by the late Rev. H. A. Macpherson in the 'Victoria History,' and refers to a pair being shot at Edenhall.

KINGFISHER. This beautiful bird is fairly common in the Eden Valley. A pair bred for six consecutive seasons in a hole in the bank of a small stream near Great Salkeld. This nesting site was destroyed by the curiosity of some men, who dug it out to see if the nest was composed of fish bones. I have known of three nests in one season in the parish of Great Salkeld.

(To be continued.)

Naturalist.





Fissured Limestone near the top of Whitfield Gill.



Photos by]

Semmerwater with Adelboro' in the distance.

[H. E. Wroot.

YORKSHIRE NATURALISTS AT ASKRIGG, 10th-12th JUNE 1905.

A GOODLY number of Yorkshire Naturalists spent Whit week-end in the beautiful district around Askrigg, a place which is not yet overrun by the 'tourist,' where only the more enthusiastic of cyclists care to travel, and where, thank heaven, the motor-car is only occasionally seen or smelt.

Only those who are acquainted with the North Yorkshire dales and moors and gills can form any idea of the charming views which were constantly before those participating in the 187th Meeting of the Yorkshire Naturalists' Union. With such surroundings, and excellent guides, genial companions, numerous geological, botanical, and other problems to solve, perfect weather, and an inn where no pains were spared to cater for the needs of hungry naturalists, there is no wonder that there were feelings of regret on Monday evening as the train rolled in the station to convey the members to their respective towns.

Saturday was devoted to the investigation of Whitfield Gill and the fells beyond. The 'waterfalls' hardly justified their name—some being almost quite dry. Some members of the party who had long been familiar with them never remembered their being so dry. On the following day the moors were traversed as far as Muker, in Swaledale; a few of the more enthusiastic of the party going still further, towards Kisdon Force. Monday was devoted to an examination of Raydale side and the beautiful Semmerwater. The sides of this mere were carpeted with various wild flowers. Of particular interest was the profusion of Bog-bean, Globe-flower, and the rose-pink Mealy Primrose.

As on previous week-end excursions, the evenings were pleasantly and profitably occupied by hearing and discussing papers of local interest. Mr. W. Horne, F.G.S., of Leyburn, delivered a lecture on the various objects of pre-historic date which have been found near Leyburn, and exhibited some of the more remarkable specimens. We hope to give a fuller account of these at a later date. Mr. J. Hartshorn gave a description of the botanical features of the district, and Dr. W. G. Smith alluded to the local problems in plant distribution. There was also a discussion on mapping, which may prove fruitful of good results.

For a more general account of this excursion we would refer our readers to the 'Yorkshire Observer' for the 13th June.

Mr. M. L. Thompson, F.E.S., reporting for Entomology, writes that the following beetles were met with by sweeping herbage between Askrigg and Semmerwater :—

<i>Pterostichus madidus</i> F.	<i>Apion africanus</i> Hbst.
<i>Tachinus marginellus</i> F.	<i>Apion punctigerum</i> Payk.
<i>Philonthus varius</i> Gyll.	<i>Otiorrhynchus picipes</i> F.
<i>Anthobium minutum</i> F.	<i>Polydrusus pterygomalis</i> Sch.
<i>Brachypterus urticae</i> F.	<i>Phyllobius oblongus</i> L.
<i>Meligethes aeneus</i> F.	<i>Phyllobius calcaratus</i> F.
<i>Liathus haemorrhoidalis</i> F.	<i>Phyllobius urticae</i> DeG.
<i>Telephorus pallidulus</i> F.	<i>Phyllobius argentatus</i> L.
<i>Telephorus nigricans</i> Müll.	<i>Phyllobius viridicaris</i> Laich.
<i>Telephorus haemorrhoidalis</i> F.	<i>Phyllobius pomonae</i> Ol.
<i>Rhagonycha limbata</i> Thoms.	<i>Phyllobius viridicollis</i> F.
<i>Malchodes marginatus</i> Lat.	<i>Liosoma ovatum</i> Clair.
<i>Chrysomela varians</i> Schal.	<i>Caliodes geranii</i> Payk.
<i>Longitarsus suturalis</i> Duft.	<i>Caliodes quadrimaculatus</i> L.

Of these, the most interesting is *Caliodes geranii*, found in some numbers on *Geranium sylvaticum*, which grows so freely in the district.

On arriving at Semmerwater a search was commenced in likely places on the margin of the lake, and the following insects were taken :—

<i>Nebria brevicollis</i> F.	<i>Bembidium tibiale</i> Duft.
<i>Loricera pilicornis</i> F.	<i>Lybius fuliginosus</i> F.
<i>Chlaenius nigricornis</i> F.	<i>Lathrobium elongatum</i> L.
<i>Pterostichus nigrata</i> F.	<i>Stenus junco</i> F.
<i>Anchomenus adipex</i> F.	<i>Donacia sericea</i> L.
<i>Anchomenus parvumaculatus</i> F.	<i>Phyllodecta vulgarissima</i> L.
<i>Anchomenus viduus</i>	<i>Phyllodecta vitellinae</i> L.
var. <i>moerius</i> Duft.	

The brilliant *Chlaenius nigricornis*, of which a single specimen was found under a stone, has not been previously recorded for this division of the county.

CONCHOLOGY.—Mr. T. Castle writes: The conditions were unfavourable for good results being obtained amongst land Mollusca, owing to an absence of rain for the previous five weeks. In consequence, we were unable to confirm the existence of many species recorded for Yoredale, or to add any fresh ones to the list, although there is an abundance of food plants and many most suitable localities in the district visited, Mill Gill and Whitfield Gill being very fine collecting-grounds indeed. Diligent search in the streams and suitable places adjoining, however, failed to turn up *Planorbis glaber*, which had been reported to occur here.

It is also worthy of note that many freshwater shells found in great abundance in the streams and ponds of the West Riding of Yorkshire, such as *Limnæa peregra*, *L. truncatula*, *L. palustris*, *Sphærium corneum*, *Angulus fluviatilis*, *Bythinia tentaculata*, and others, were absent here, though perhaps under more favourable conditions some of these might have been met with. As it was, only one specimen each of the common shells *Limnæa peregra* and *L. truncatula* was taken on the excursion, viz., at Semmerwater. Probably also the presence of various aquatic birds at this lake accounted for the scarcity of the shells. Numbers of empty shells of the Duck Mussel, *Anadonta anatina*, indicated their presence, though these feathered conchologists had kindly left us a few alive, together with a number of *Angulus fluviatilis*, *Pisidium amnicum*, and *Planorbis albus* to add to Monday's list, which is as follows:—*Anadonta anatina*, *Angulus fluviatilis*, *Limnæa peregra*, *L. truncatula*, *Pisidium amnicum*, *Planorbis albus*, Semmerwater; *Arion ater*, *Agristolimax agrestis*, *Arion hortensis*, *Hyalina crystallina*, *H. cellarius*, *H. radiatulus*, *H. nitidula*, *H. fulva*, *H. alliaria*, *Helix rotundata*, *H. cericea*, *H. hispida*, *Pupa umbilicata*, and *Azeca trident*, Mill Gill and Whitfield Gill; *Helix nemoralis* dead shells only, *H. rupestris*, *Balea perversa*, *Clausilia rugosa*, *C. dubia*, Whitfield Gill; *Cochlicopa lubrica*, Mill Gill and Whitfield Gill; *Helix arborum*, Mill Gill, Whitfield Gill, and Bambridge; *H. rufescens*, several places; *H. lapicida*, on Leyburn Road near Nappa Hall.

FLOWERING PLANTS.—Mr. J. Hartshorn writes:—The gloriously fine weather favoured those studying 'Flowering Plants,' and the whole week-end was most enjoyable. Each route yielded much of interest, but perhaps the richest in the luxuriance of its characteristic blooms was the border of Lake Semmerwater. Here a never-to-be-forgotten glory of Bog-bean, Bird's Eye Primrose, Globe Flower, Valerian (Marsh and Common), and Bay-leaved Willow compelled the admiration even of non-botanists, whilst an added treat amongst the other specimens gathered were two species of Orchis—Marsh Orchis and the small *Habenaria albidula*.

Over 150 species were recorded as the result of observations by the Rev. J. R. Wynne-Edwards (Head Master Leeds Grammar School), Mr. J. A. Jones, of West Hartlepool, and others. Of those in which most interest was taken the following merit record:—Desser Spearwort, Globe Flower, Herb Christopher, Yellow Water-Lily, Yellow Mountain Pansy (*Viola lutea*), Round-leaved Sundew, Scurvy Grass, Large Bittercress (*Cardamine*

amara), White Milkwort, Wood Stitchwort, Shining Geranium, Cat-leaved Saxifrage (*Saxifraga hypnoides*), *Saxifraga granulata*, Wood Sanicle, Sweet Cicely, Butterwort, Early Purple Orchis, Spotted Orchis, Tway-blade, *Orchis latifolia*, *Habenaria albida*, Bladder Fern, Green Spleenwort, Wall Spleenwort (*Asplenium Ruta-muraria*). The Rev. J. R. Wynne-Edwards found *Thlaspi alpestre* growing on lead waste above Ellerbeck.

We are indebted to Mr. H. E. Wroot for the photographs accompanying these notes (Plate XV.).

APPENDIX I.

GEOLOGICAL NOTES ON THE DISTRICT AROUND ASKRIGG.

COSMO JOHNS, F.G.S.

Dealing with a district so well known, it was hardly to be expected that, in a classic region like that of the Yoredales, any new data could be collected in so short a time or any fresh light thrown on the special development of its Lower Carboniferous rocks. The visit did, however, suggest that the time had come when a new effort should be made to do something towards discovering the exact conditions under which the Carboniferous rocks of Yorkshire were deposited, and to attempt to unravel the somewhat complex problem of their later history.

Before discussing this it would perhaps be best to briefly describe some of the geological features noticed during the visit. Whitfield Gill is, of course, too well known as Phillips' typical example of the Yoredales to require more than the intimation that it could not fail to arouse interest even among geologists who had visited it before. The third day found an enthusiastic band of geologists tramping round fair Semmerwater. One of the very few survivals of the vast number of lakes and morasses that dotted the county at the close of the glacial period, it will soon be but a name. For what with man's persistent efforts to win, for his own benefit, the land from the water, and nature's never-ending work of denuding the hill sides and depositing her spoils at the bottom of the lake, the delta at the mouth of the stream that feeds it is rapidly growing and the area of the little lake is diminishing. At the time of the visit the water was lower than has been the case during the last fifty years. An effort was made to discover indications of the old strand lines, but the drift that now covers the hill sides is

constantly slipping and must have obliterated most of the traces of the old lake levels. Rather strong evidences of an old strand, about twelve feet above the present water level, were observed, but did not extend very far. The gorge that had been cut in the drift at the end of the valley was carefully examined, and it was considered that, for the greater part of its length, the drift which forms the steep sides of the gorge has a core of solid rock at no great depth. This conclusion was strengthened by the evidence of springs here and there on the slopes and the narrowness of the valley at Bainbridge, where the drift dies away and the solid rock appears. At this point there were indications of a fault with a small downthrow to the north. Evidently attempts at mining had been made and galena was found on the spoil heap.

With reference to the larger problem that confronts one, namely, the determination of the sequence and character of the earth movements that produced the differentiation of the Lower Carboniferous rocks north and south of the Craven faults, the great difficulty is the want of reliable data. Despite the number of fossil collectors and their energy in making collections, much of their work is valueless for working out the life zones of the Carboniferous rocks owing to the indefinite way in which their finds are recorded, and to the possibility that the determination of the specific names of many of the fossils may be open to question. In the Bristol area, and also in the Gower Peninsula where the Carboniferous Limestone has received much intelligent attention with a view to determining its zonal divisions, the corals seem to be the group that promises the best results. It would seem that the present is the time to make a special effort to investigate the distribution of life in both a vertical and horizontal direction in the Yoredale rocks. The task is simplified in that the alternating limestones, sandstones, and shales form lithological divisions that can be recognised over a large tract of country, while the countless streams have carved the old Carboniferous plateau in such a way that miles of exposures of the different beds are available, and may be examined.

It is essential, however, that the exact position from which each fossil is obtained should be recorded, and for that purpose the 6-inch Ordnance Map properly divided and marked may be used and a careful record kept of the work done. The question might be asked: 'What value would such work possess when completed?' The reply is, that the knowledge of a method of correlating the Carboniferous Limestone series north and south

of the Craven Fault would assist in solving the first step in the problem we have been discussing. We should then learn something of the way the old Silurian floor was collapsing under the sediments that were being laid down on the bottom of the Carboniferous ocean. Then we should be able to face the task of tracing the later movements, to discover when the inception of the Market Weighton axis took place and how it progressed, to describe how the Pennine Range was left standing as a mighty barrier between the east and west, while the newer seas ebbed and flowed and left the records of their teeming life. Perhaps, then, we may learn why it is that the present limits of the coal-fields are foreshadowed in the thinning of the coal measures themselves towards those limits, as if the Carboniferous sea was shaping the present form of the coal basin.

This was the problem that suggested itself to the writer as the familiar paths rendered famous by the father of Yorkshire geology were gone over. It is a big one—much labour must be expended before much progress can be made—but every step will make the rest easier, and it would be but fitting that in Yorkshire should be worked out the history of the rocks—to trace the margins of those ancient seas and the building of the hills. For that after all is the Real Geology.

APPENDIX II.

BOTANICAL SURVEY AROUND ASKRIGG.

DR. W. G. SMITH,
Leeds.

Askrigg proved to be a good centre for botanical survey, but three days were only sufficient to show what a large district has to be worked from that centre, and how interesting it is. In spite of the remote situation of Askrigg, there was a satisfactory muster of the Botanical Survey Committee. The routes taken were those on the circular for each day, but an attempt was made to ascertain the features necessary for a botanical survey by selecting routes more suitable for this purpose. Thus, on Saturday not only was Whitfield Gill explored by the main party, but the moors on the N.E. side were also visited and recorded; while on Monday a longer and more upland route was followed to supplement the observations of the main party to Semmerwater and Parker Gill. The chief features of the vegetation can only be briefly noted till further survey is carried

Naturalist,

out. This has already been undertaken by a member of the committee.

A. CULTIVATED LAND OF VALLEY BOTTOM AND LOWER SLOPES.—This is entirely under grass, either as meadow or pasture. A great variety of plants was found in these meadows, and a large proportion of the species recorded by the Botanical Section are meadow plants.

B. WOODS.—These are found chiefly on the lower slopes of the main valley or in the gills. Whitfield Gill is one of the best of the gill woods, and yielded a large number of species. The altitude of quite a number of woods and plantations in this district is worthy of notice. The larch wood at Whitfield Crag, rising to over 1,500 feet, was visited, but owing to the scanty shelter afforded by the trees in the upper part, it did not show any striking features in the undergrowth. In Raydale, above Semmerwater, pine plantations of considerable size have been formed up to an altitude of 1,800 feet. Unfortunately, time did not permit of a detailed examination of these.

C. MOORLAND.—(a) From the upper limit of the meadow land, the slopes up to the upper Limestone scars are occupied by a broad belt of grassy pasture; this was found very constant round Askrigg, also in Swaledale round Muker and up to Kisdon Force, and again all round Semmerwater and the valleys above it. The grass pasture is either the poorer *Nardus* and *Agrostis* type, or it is made up of *Festuca ovina* and other grasses better suited for sheep pasturing.

(b) Heather is found covering the greater part of the moor plateau above the limestone slopes. The Heather extends to the top of the valley slopes, where it may be seen almost on the limestone scars. Near the edge of the heather moor there is a zone of Heather, Bilberry, etc., frequently interrupted by green tracts of the taller rushes which indicate constant moisture in the soil. Towards the centre of the moors the vegetation consists of Heather and Cotton Grass on deeper peat. On the summits round Semmerwater deep banks of peat could be seen, and although these were not visited, they are probably covered with Bilberry and Cotton Grass with *Rubus chamaemorus*, an association characteristic of watersheds in the Pennines. On Billingside Moor the Heather occupied a whole ridge from 1,800 feet down to the edge of Cragdale Beck. This is interesting, because it was the only instance seen during the three days of Heather intruding from the summits into the zone which was in all other places grassy pasture.

Considered as a whole, the vegetation of the Askrigg district is much the same as that found in Upper Wharfedale and on Ingleborough and neighbouring hills; a similar vegetation extends to the north to Upper Teesdale and Weardale. It is very distinct from the Pennines round the Calder with their continuous Cotton Grass moorland on the plateaux, and also quite different from the uniform stretches of close Heather which cover so much of the Cleveland.

SHELLS.

***Helix hortensis* Muller.**—I have never met with or heard of this species on the Lincolnshire Limestone north of the Witham. On Tuesday, the 30th of May, Mr. Thomas Stow and I were in Reed's Quarry in Broughton Wood. On Thrush stones in a limited area, along with *H. nemoralis*, we took about ten *H. hortensis* vars. *albina* and *lutea*, with one very beautiful *lilacinæ* Taylor.—E. ADRIAN WOODRUFFE-PEACOCK, 3rd June 1905.

FLOWERING PLANTS.

***Ranunculus sardous* Crantz near Louth.**—This is a rare species in Lincolnshire except on the estuarine alluvium. A very large specimen was taken in a cornfield on boulder clay north of Louth, at the Lincolnshire Naturalists' Union meeting on the 1st of June.—E. ADRIAN WOODRUFFE PEACOCK, Cadney, Brigg, Lincolnshire, 3rd June 1905.

***Spergularia rubra* near Sheffield.**—On Whit-Monday I found this plant in abundance by the side of the footpath between the Norfolk Park and Intake. It also grows in a sandy road between Crookes and Tapton, Sheffield. The three places mentioned are all higher than the 500 feet given as the limit in Lees' 'Flora.'—C. F. INNOCENT, Sheffield.

Lincolnshire Plant Notes.—Amongst the plants in flower found by members of the Louth Antiquarian and Naturalist Society, on 6th June, were an exceptionally fine bloom of the Bird's-nest Orchid (*Neottia nidus-avis*) in a plantation near Kenwick, a beautiful pink variety of the Bugle (*Ajuga reptans*) near Maltby Wood, and on the west side of the same wood a cluster of the Slender Yellow Trefoil (*Trifolium filiforme*).—C. S. CARTER, Louth.



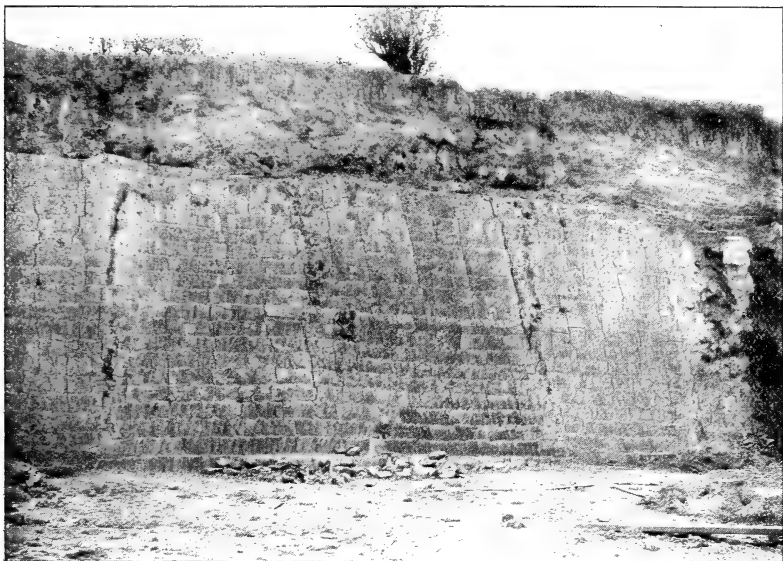


Fig. 1.—Charles Street Clay Pit, Louth.



Photos by

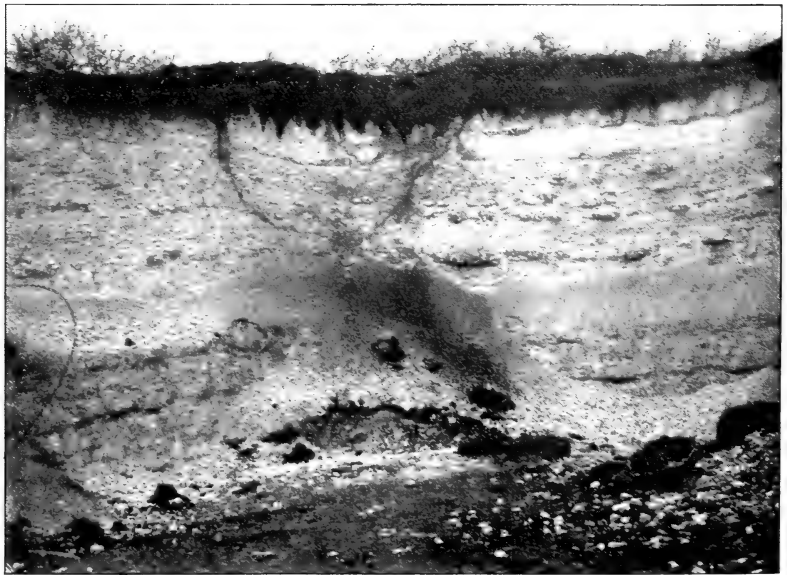
Fig. 2.—Hubbards Valley, Louth.

[Godfrey Bingley.]





Fig. 1.—Cutting, west end of Withcall Tunnel.



Photos by]

Fig. 2.—Chalk Pit, Boswell.

[Godfrey Bingley.

NOTES ON THE GEOLOGY OF THE LOUTH DISTRICT.

J. W. STATHER, F.G.S.,

Hull.

THE following notes have been put together at the request of the editors of 'The Naturalist,' by a participator in the recent very successful Lincolnshire excursion arranged by the Geological Association of London, and the Yorkshire Geological Society.

Louth is a thriving little town on the eastern slopes of the Chalk Wolds of Lincolnshire, and a very pleasant and convenient centre from which to study the physical and geological features of the district.

Quite close to the town is the well-known Hubbards valley, equally attractive to both geologists and lovers of the picturesque. This valley is believed by the newer school of glacialists to be a relic of the Great Ice Age. Professor Kendall has shown us in Cleveland and elsewhere that the North Sea ice, besides piling up drifts and boulders on our shores, so interrupted and modified the normal drainage of the land along its margin, as to produce new channels and valleys possessing special features of their own. Hubbards valley is believed to be one of these (Plate XVI., Fig. 2).

East Lincolnshire, like East Yorkshire, is thickly covered with Glacial Drift; but in Lincolnshire it is more difficult to make out the relationship of the various beds because of the almost total absence of coast sections. One of the best sections in East Lincolnshire is that exposed in the old clay-pit in Charles Street, Louth. As Mr. Godfrey Bingley's photograph plainly shows (Plate XVI., Fig. 1), two boulder clays are here present separated by an intermittent seam of sand and gravel. The upper of the boulder clays is six to eight feet thick, and may be safely correlated with the Hessle clay of Holderness, partly from its colour and texture, but chiefly because it contains the same limited but characteristic variety of pebbles and boulders. The lower clay, apparently a very thick deposit, is greyer in colour and much harder than the upper clay, and contains the boulders commonly found in the lower clays of the Yorkshire coast. It has recently been stated that the clays and gravels exposed in this clay pit are similar to the Kirmington series. We saw nothing in support of this view. On the other hand, the whole section in the Charles Street pit could, in our opinion, in all its essential particulars be matched over and over again, almost anywhere on the Holderness coast.

Although there are so few places in the neighbourhood of Louth where the glacial beds can be seen in sequence, boulders are everywhere extremely abundant. They appear to be of the same types that occur in East Yorkshire, with perhaps a slightly higher proportion of Scandinavian rocks. Among the larger boulders, perhaps the most notable is that in the stable-yard at Thorp Hall, and if permission could be obtained it should at once be removed to the Louth Museum. It is a fine sample of Laurvikite from the Christiania district, and one of the largest boulders of its kind recorded on this side the North Sea. Another ice-carried boulder which the local antiquaries regard with much interest is the celebrated 'Bluestone' (basalt) at Louth, but the mineral structure of this rock is not sufficiently distinctive to indicate the locality from whence it came. A visit was also paid to the village of Benniworth, (nine miles west of Louth) to inspect a large boulder recorded as Laurvikite, which has figured as such in the British Association list for some years. The naming of this rock was found to be wrong, and quite misleading to anyone consulting the lists. This error, probably due to the uninstructed enthusiasm of some tyro, cannot be passed by as a pardonable blunder, for it is well known that both the Chairman and the Secretary of the Erratic Blocks Committee are always willing to assist in the determination of doubtful specimens.

THE UPPER CRETACEOUS SERIES.—Though the solid geology of East Lincolnshire consists of Upper Cretaceous rocks (white chalk), there are unfortunately no coast sections at all. The quarries around Louth are fairly representative of the whole thickness of Lincolnshire Chalk. Pits near the town show the Grey Chalk and *Belemnitella plena* marls with Middle Chalk above. Westwards, towards Elkington, higher beds come in.

When the 'Survey Memoirs on the Geology of Lincolnshire' were published (1890), all the flint-bearing chalk seen in the county was referred to as Middle Chalk. In the Memoir on 'The Cretaceous Rocks of Britain,' published in 1904, Mr. A. J. Jukes-Browne modifies his views on this point, on the Palæontological evidence produced by some collectors working north-west of Louth.

One of the *critical* quarries near Boswell Farm was visited, several very interesting fossils being obtained, including good examples of *Micraster*, *Holaster*, etc., giving a *general* impression of an Upper Chalk fauna. Mr. Bingley photographed this quarry (Plate XVII., Fig. 2).

THE LOWER CRETACEOUS SERIES.—This series, as developed in Lincolnshire, is of extraordinary interest to geologists, both from a stratigraphical and palæontological point of view. Recognising this fact, two days were set apart for the examination of these rocks. The cuttings on the Great Northern Railway between Withcall and Willingham occupied the first day, and the western escarpment, where occurs the natural outcrop of the beds, the second day.

The Lincolnshire Lower Cretaceous series is particularly instructive to geologists familiar with the Yorkshire coast. At Speeton the beds between the Kimeridge Clay and the Chalk consist entirely of dark clays, only varying in such minor characteristics as colour, quantity of pyrites, or the number and nature of the contained septarian nodules.

In Lincolnshire the beds of identically the same stratigraphical age consist of sandstone, limestone, and beds of shale, the whole series forming a very instructive study in comparative geology.

Although the lithology of the two areas (Speeton and Lincolnshire) differs so widely, it has been proved that the life-zones as defined by the belemnites of Speeton obtain also in Lincolnshire. The general fauna of the two areas is also remarkably similar, though, as might be expected, the species differ in relative abundance.

The photograph on Plate XVII., Fig. 1, shows the section exposed at the west end of the Withcall tunnel. Here is seen the junction between the Upper and Lower Cretaceous series, viz. :—The Grey Chalk (at the top), Red Chalk, and Carstone.

We are indebted to Mr. Godfrey Bingley for taking the photographs for these notes, and also to our Lincolnshire friends for their assistance in making the excursion both enjoyable and profitable.

FISHES.

Angler Fish at Goole.—A small specimen of the Angler (*Lophius piscatorius*) was captured at the mouth of the Don on the 20th May: it lived for some hours. Some of our sailors who have been on trawlers know it by the name of Monk fish. It is strange that it is also known as Devil fish. This specimen is only eight inches in length. One was taken at Whitgift on 27th May 1884, and was twenty inches long. The dates suggest a migratory habit.—T. BUNKER, Goole, 22nd May 1905.

NOTE ON

JANASSA BITUMINOSA, SCHLOT., FROM THE MARL SLATE, THICKLEY, DURHAM.

JOHN COGGIN BROWN, B.Sc.

‘THE outcrop of the Magnesian Limestone in South Durham forms a fine, though not very elevated, escarpment facing westward and indented into a great number of narrow bays by denudation. The following places from north to south are in the inland promontories of this escarpment, and serve to indicate clearly the range of this singular rock [only those places in the neighbourhood of Thickley are given]:—Merrington and Middlestone, Tottenham and Grange Hill, Eldon, Middridge and West Thickley, Thickley, Redworth White House, Killerby, Headlam and Piercebridge, where the formation crosses the Tees into Yorkshire.’* The section of the Permian rocks now exposed at Thickley is not the common one. Usually the Magnesian Limestone is underlain by the Marl Slate, under which the yellow sands are found resting unconformably upon the surface of the denuded Coal Measures. At Thickley, however, in the present section the Yellow Sands are entirely wanting, the Marl Slate resting directly and unconformably upon the surface of a hard Coal Measure sandstone, as the accompanying photograph shows (Plate XVIII., Fig. 1). The Marl Slate here is also developed on an unusual scale, being between five and six feet thick, and composed of layers of a soft, yellow, flaggy arenaceous limestone, which become somewhat harder near the top as they approach the Magnesian Limestone, which is here very hard, of a yellow colour, and contains some 19 genera † of the common Permian fossils in one particular band first found by Calvert, but now covered up. ‡ As the section is made into the steep hill side forming the outcrop of Permian formation it gradually exposes from eight feet at the southern end to 30 feet at the northern extremity. Over the lower portions—Marl Slate and Coal Measure sandstone—there is a thick deposit of glacial drift which contains some beds of sand. The Marl Slate of Thickley and

* ‘Geology of Northumberland and Durham,’ by Prof. G. A. Lebour, p. 34.

† ‘Zig-Zag Ramblings of a Naturalist.’ Manson. List of fossils from Thickley.

‡ ‘Geology and Natural History of Durham,’ Calvert, p. 74.



Fig. 1.—Photograph of Strata at Thickley, Durham.

a, Coal Measure Sandstone. *b*, Marl Slate. *c*, Magnesian Limestone.



Fig. 2.—Teeth of *Janassa bituminosa* (actual size) from the Marl Slate, Thickley, Durham.

a, Crushing surface of tooth. *b*, Root of tooth. *c*, Under surfaces. *d*, Shagreen.

the neighbouring district has long been famous for the remarkable assemblage of fossils which it contains, especially for 'the number and beauty of the fossil fishes and other vertebrates,'* and the locality was noted in the past as one of the best collecting grounds for British Permian vertebrata. Owing to the quarry becoming disused in the 'seventies,' no collecting has been done here since then. Quite recently, however, another portion of the quarry has been opened, the Coal Measure sandstone being worked as a building material. A careful examination of the Marl Slate overlying this has resulted in the discovery of a few fossil fish for which the Marl Slate is so well known, specimens belonging to the genera *Palæoniscus*, *Acentrophorus*, *Platysomus*, *Acrolepis*, and *Pygopterus* having been found; although the fossils are very scarce, somewhat fragmental, and not present in this portion of the Marl Slate to anything like the extent in which they were obtained in other parts of the quarry by Duff, Howse, Calvert, and other collectors long ago.

One specimen of the teeth of *Janassa bituminosa* has been obtained, a drawing of which is shown (Plate XVIII., Fig. 2). The remains of this fish are of very rare occurrence in the British Marl Slate, but are fairly common in the German Kupferschiefer, the division of the German Permian corresponding to our Marl Slate. Schlotheim first named the fish and showed its relation-ship to the Petalodontidæ, a family of the Batoidei or Rays.

During the years 1865-1869 the late Joseph Duff, of Bishop Auckland, found four specimens of the teeth of this fish in the Marl Slate of Middridge, which is quite close to the place where the present specimen was obtained. Hancock and Howse described these†, and stated then that they were the first and only specimens discovered in England; they gave the following general description of the dental armature of this fish:—'The teeth are arranged in both upper and lower jaws; in both they are placed in transverse horizontal rows (there being from four to seven such rows) across the anterior portion of the jaws. Each such horizontal row is composed of seven teeth (five primary and two secondary), placed lengthwise with the cutting edge in front. A large symmetrical primary tooth is situated in the centre; on each side of this there are a first and second asymmetrical primary tooth, making up the five primaries. These

* 'Geology of Northumberland and Durham,' by Prof. G. A. Lebour, p. 35.

† 'Transactions of the Natural History Society of Northumberland and Durham,' 1874.

are flanked on either hand with a single secondary or petalodontoid tooth, completing the full complement of seven. They diminish in size from the centre, the flanking teeth being quite small in comparison with the large central primary tooth.' In the present specimen only these flanking petalodontoid teeth are preserved, along with a quantity of shagreen, the covering of the body of the fish. The teeth are about $\frac{1}{2}$ inch long by $\frac{2}{5}$ of an inch wide, and consist of three parts: an anterior cutting margin wider than long; a posterior ridged crushing surface, having six transverse imbricated ridges, and a somewhat elongated root. The upper surface of the teeth is covered with a thick layer of white enamel in striking contrast to the root and undersurface, which are black. The shagreen consists of minute reddish bodies exhibiting a great variety of form, some being rounded, others more elongated, whilst others are irregular and have denticulated margins. The author would here acknowledge his indebtedness to the kindness of Professor G. A. Lebour, of the Armstrong College, Newcastle-on-Tyne, who named the specimen.

REVIEWS AND BOOK NOTICES.

Practical Hints for the Field Lepidopterist. Part III. By J. W. Tutt, F.E.S. Price, 6s. net (interleaved). Published by Elliot Stock, 62, Paternoster Row, E.C.

This is another, and we believe it is intended to be the last, of the author's volumes on 'Hints.' As its title implies, it is a collection of concise notes taken from his own, and many of his friends' practical experiences in the collecting and rearing of lepidoptera; and also largely culled from the various entomological journals. In addition to this, however, there is a series of five chapters on Collecting and Collections; Eggs and Egg Stage; Preservation, Photographing, and Description of Eggs; Larvæ and Larval Stage; and Pupa and Pupal Stage. These form the first portion of the volume and are most valuable—quite as much in indicating (as is their aim) what is still to be learnt, and suggestions as to the best methods of learning—as in showing what we already know. These chapters, which are illustrated by seven plates, we cannot speak too highly of, as being a guide to the entomologist who is anxious to make a *scientific* study of the early stage of the lepidoptera. The 'Hints' arranged under each of the months are equally valuable to the collector; and together with those contained in the two previous volumes, form a mass of information which should make the collecting and study of our native lepidoptera in these times wonderfully easy as compared with what it was in our early days. But the book in our opinion has one serious blemish, and that is the *arrangement* of the various orders. How unintelligible this is will be seen from the following taken from the June chapter (and as practically the same order is adopted, so far as the species are treated on, in all the other months, we presume there must be some reason for it). Eriocraniides, Nepticulides, Adelides, Elachistides, Argyresthiides, Glyphipterygides, Gracilarides, Tortricides, Coleophorides, Plutellides, Gelechiides, Crambides, Pyralides, Alucitides, Psychides, Hepialides, Zeuzerides, *Ægeriides*,

Naturalist,

Anthrocerides, Drepanulides, Brephides, Geometrides, Lachneides, Dimorphides, Sphingides, Notodontides, Nolides, Deltoides, Noctuides, Lithosiides, Hesperiiides, Papilionides!! Fancy the appearance and *use* of a collection arranged in this order. Surely the author has done his best to mix up the genera in as ridiculous a fashion as he could. To commence with the minute Tineæ, then introduce the Tortrices into the middle of the order (between Gracilariides and Coleophoriides), to be followed later by Hepialides and Anthrocerides; then further on the Geometridæ, with the Sphingidæ midway between them and the Noctuæ; followed again by the Lithosidæ, and *finishing* with the Butterflies. The author, we know, has of late years done most of his field work abroad, and this may be the outcome of his Continental studies, but if so, he may rest assured that British collectors generally will not follow anything so utterly at variance with their notions. There are several inaccuracies in the text, as on page 80, where it is stated that the second brood of *Acidalia trigeminata* passes the winter in the pupa stage. No British *Acidalia* winters as pupa in a wild state, and even in confinement any pupæ which failed to disclose the imagines as second, or even third brood, in the autumn, would we feel sure die months before they were due to appear in the following year. Then at page 53 it is stated that bilberry 'is possibly' the food of *Cloantha solidaginis* in nature, whereas it has long been thoroughly known that bilberry *is* the natural food of the species, and is probably the only plant on which it feeds in a wild state. Needless to say, these slight mistakes detract little from the value of the book: indeed, the wonder is that out of some 1,200 'Hints' which it is said to contain, so few errors are to be detected in it; and we heartily congratulate the author on the completion of a most useful work.—G. T. P.

On False Education. By Frederick Hovenden. Watts & Co., London. 3d.

In this pamphlet the author states:—'Probably it is not too much to say that 80 per cent. of human suffering and misery, in all classes of society, arises from ignorance, and especially from that most terrible form of ignorance, educated ignorance—i.e., false education. There can be no doubt that all chemical and biological (i.e., life) phenomena are physical phenomena—that is to say, the grouping of sub-atoms, atoms, and molecules; also their motions. Hence the interpreter of Nature, the physicist, should be the high priest of knowledge. Unfortunately, the minds of physicists have been warped and stultified by the educational world,' etc., etc. 'The object of this essay is to expose the absurdities of this mathematical order of thought and to substitute for it a rational one.' From the preceding quotation our readers will see the object of the essay, and we must leave those interested to read it for themselves and decide for themselves whether Mr. Hovenden has carried out his object.

Uses and Wonders of Plant Hairs. By Kate E. Styan. London: Bemrose & Sons. 65 pp. with 10 plates. 1s.

This little volume contains much information crowded into its 65 pages, compiled evidently from several standard text books. The subject is a fascinating one, and will not only repay study by those in search of pretty objects for the microscope, but also the serious botanist concerned with the complicated problems of plant protection in its varied aspects.

Part 31 of the 'Transactions of the Yorkshire Naturalists' Union' has been issued, and contains the 42nd and 43rd Annual Reports of the Union, a List of Members, and reprints of the Excursion Circulars from the 171st to the 185th meeting. These latter are exceedingly useful, and, bound up in this the first of the new Miscellaneous Series of the Transactions, will be handy for reference. The Annual Reports of the Union are also of value, inasmuch as they contain an epitome of the progress in the various branches of natural history during the year. For this alone no Yorkshire naturalist can afford to be without this part. It is sold by A. Brown and Sons, 5, Farringdon Avenue, at one shilling.

NORTHERN NEWS.

The death is announced of Lieut.-Colonel L. H. L. Irby, author of the 'Key List of British Birds,' and of Sir Bernard Samuelson, F.R.S., one of the pioneers of the Cleveland iron trade.

Mr. E. T. Newton, F.R.S., has retired from his position as palæontologist to H.M. Geological Survey, after a distinguished service extending over forty years. Dr. F. L. Kitchen has been appointed to succeed him.

We are pleased to learn that Mr. Porritt, for many years connected with 'The Naturalist' as entomological referee, has been appointed on the editorial staff of the 'Entomologists' Monthly Magazine,' in place of the late C. G. Barratt. We also learn that the same gentleman has enriched the national collection of British Lepidoptera by a number of specimens from the Huddersfield district.

The Bradford Corporation has acquired the collection of pre-historic remains formed by Mr. W. Cudworth, of that city. It consists of implements of the Eolithic, Palæolithic, and Neolithic periods. Amongst the last-named are many flint weapons from the Yorkshire Wolds and the moorlands near Bradford, and a few bronze axes found near Bradford. There is also a case containing the remains of extinct mammalia, from the Cresswell Crag, Derbyshire.

Referring to the remarks in this journal for June in reference to cinerary urns in general and the one recently found near Bradford in particular, we find that in 'Yorkshire Notes and Queries' for July 1904 there is a cinerary urn figured (p. 109) which is almost identical as regards the ornamentation, with the vase found on Baildon Moor. It was found on Barnside Common, near Midhope. As in the case of the Bradford urn, the upper portion, or collar, is ornamented by triangular areas of cord impressions, the middle belt has scratches upon it, herring-bone fashion, and the lower portion is plain. With it was found an 'incense cup.' Both vessels are figured in Mr. J. Kenworthy's notes on the 'Antiquities of Bolderstone and Neighbourhood.'

From a number of the 'Geelong Naturalist,' the quarterly journal of the Geelong Naturalists' Club (Australia), we are glad to gather news of Mr. W. Denison Roebuck, in the following paragraph:—'At the meeting of the club on the 2nd inst. [December] our member, Mr. H. G. Roebuck, introduced as a visitor his relative, Mr. W. Denison Roebuck, a former editor of 'The Naturalist' (one of the oldest scientific periodicals in the British Isles). Mr. Roebuck, who was associated with Mr. J. W. Taylor in compiling a census of the British Land and Freshwater Shells, 'a monument of valuable labour,' would be glad of the assistance of some of our local naturalists in procuring him examples of the British mollusca that have established themselves on Australian soil.' All readers of this journal will wish Mr. Roebuck and his sister good health in their ramble round our planet.

The scientific reporter is an almost new phenomenon, and a terrible development of modern industry. 'He regardeth not what he heareth, and understandeth it not, but goeth on his way rejoicing,' though his readers do not. We cut a typical example from a local paper of wide circulation:—'Mr. J. Larder (of Louth) exhibited specimens of a rare Buttercup, viz., Dove's Foot Geranium.' No doubt the writer refers to Mr. Larder's discovery of *Ranunculus sardous* on the Purple Boulder Clay. Certainly a good find in the neighbourhood of Louth. He also probably meant to say that Mr. Larder was lecturing on the specific characteristics of our common *Geraniums*, and produced the Dove's Foot (*G. dissectum*) as an example. Similarly, in a local paper purchased by the members of the Yorkshire Naturalists' Union at Askrigg, the column devoted to 'Nature Notes' gave the news that 'The *Primus niger*.—The bud cherry has been very full of blossom this year in the Wharfe Valley.'

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THE NATURALIST.

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NOTES AND COMMENTS.

MR. W. DENISON ROEBUCK.

Part II of Mr. J. W. Taylor's 'Monograph of the Mollusca' has just appeared, and in it is the block here reproduced, which every reader of the 'Naturalist' will be glad to see. Mr. Taylor 'dedicates the genus *Arion* to Mr. W. Denison Roebuck, F.L.S., of Leeds, whose knowledge of the external morphology of the British slugs is probably unsurpassed, and whose tireless exertions have so immensely extended our knowledge of the



variation and distribution of our native species.' The same part contains a photograph of another Leeds mycologist, the late Thomas Nunneley, 'whose careful and conscientious memoir of 1837 upon the anatomy of *Arion ater* and three other species was one of the precursors of the modern scientific study of slugs.' As a frontispiece there is an excellent coloured plate showing various forms of *Limax*.

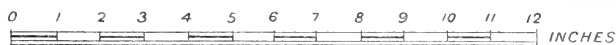
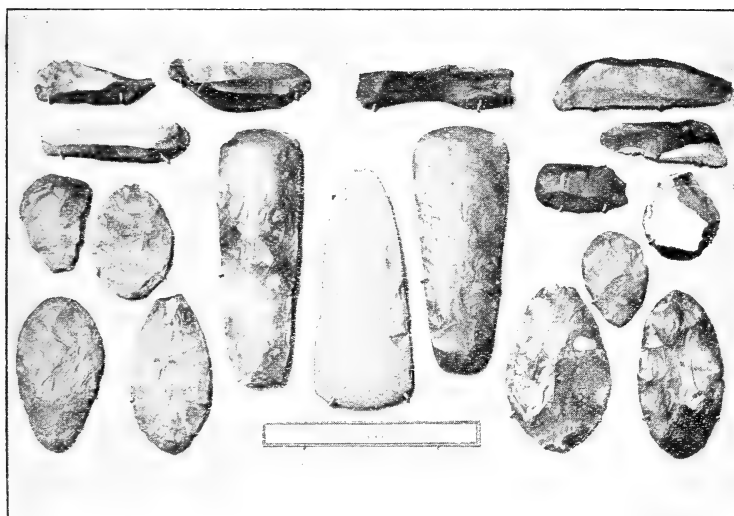
BRAITHWAITE'S MOSS FLORA.

The venerable past-president of the Yorkshire Naturalists' Union, Dr. R. Braithwaite, F.L.S., has just issued the concluding

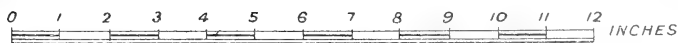
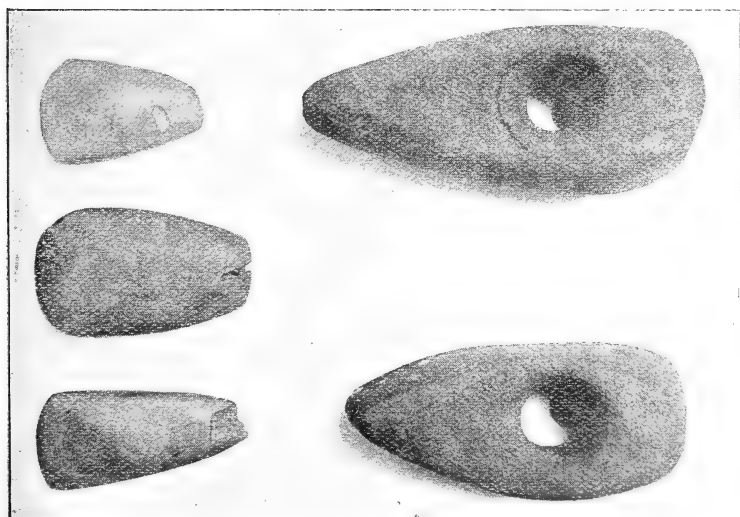
part of his well-known Moss Flora of the British Islands, a work which has occupied every moment of his 'spare' time during the past quarter of a century. The first instalment of this monumental work (which occupies three large volumes) was issued in 1887—the final part has just appeared. The 'Moss Flora' contains drawings and descriptions of the 625 species now known to exist in the British Isles. All through the work the author has selected the first specific name and date when the plant first came to be established as an individual entity, and he has continued its history, through all its synonyms, and literature of all countries, to the present time—commencing, of course, with Linnæus' 'Species Plantarum' (1753). The drawings, consisting of several thousand figures, occupy no fewer than 128 large plates. They have been done by Dr. Braithwaite himself, and are very fine indeed. This is the more remarkable when it is known that the drawing for the last plate was finished on his 80th birthday—the last page of text being completed on his 81st birthday. It is perhaps unnecessary to add that our author is a Yorkshireman, being a native of Whitby, though he has lived in London nearly all his life. We should like to congratulate Dr. Braithwaite on the completion of his task, and trust that he may long be spared to have the pleasure of seeing his work being well used by all students of the mosses and hepatics.

YORK ANTIQUITIES.

The Annual Report of the Yorkshire Philosophical Society for 1904 contains much useful information of particular value to York people. We are glad to notice that an effort is being made to render the Gardens more educationally useful, and a scheme has been drawn up for treating a portion as a botanic garden, under the direction of Mr. H. J. Wilkinson, assisted by the Rev. J. J. Briggs. Amongst the items in the Report of interest to readers of the 'Naturalist' are 'Notes on an Intrenchment on Holgate Hill,' by Mr. G. Benson, in which reference is made to some local British implements. Two of the illustrations accompanying Mr. Benson's paper are here reproduced by the permission of the Society. Bound up with the report is a reprint of Dr. Tempest Anderson's paper 'On Certain Recent Changes in the Crater of Stromboli,' which appeared in the 'Geographical Journal' for February last



British Stone Implements found in 1868 on the site of the North Eastern
Railway Gasworks.

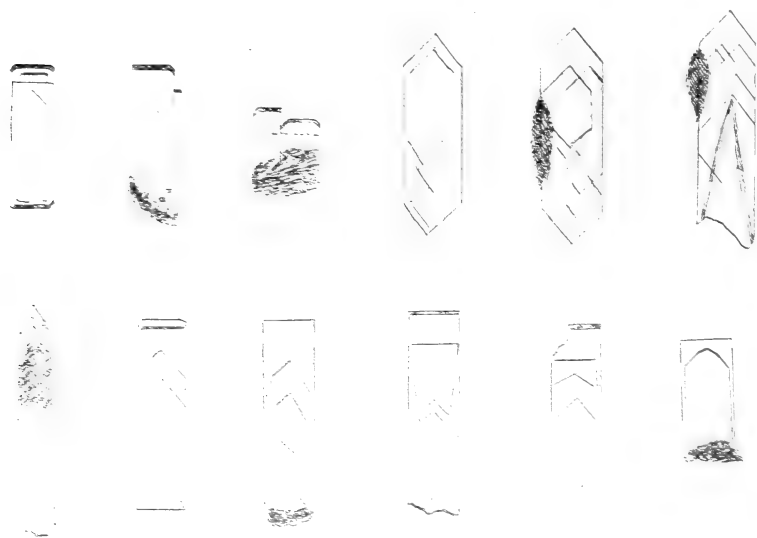


Stone Hammer-heads and Axes found near York.

1905 August 1.

BROOKITE IN CLEVELAND.

In the 'Mineralogical Magazine,' just issued, Mr. C. R. Lindsey contributes a 'Note on the Occurrence of Brookite in the Cleveland Ironstone.' The mineral was discovered whilst searching for anatase. A pound of ore from the Main Seam at Upleatham Mines was treated by the usual processes of solution, washing by decantation, and separation by heavy solution.



Crystals of Brookite isolated from the Cleveland Ironstone (magnified).

Amongst the residue obtained were some crystals of brookite in the forms shown in the accompanying illustration, kindly lent by the editor of the 'Mineralogical Magazine.' An example of the now worked-out magnetite ore of Rosedale, in Yorkshire, was examined, but yielded no Brookite.

ANGLO-INDIAN PIGMIES.*

Pigmies being 'in the air,' so to speak, at the present time, it is perhaps only natural that the Rev. R. A. Gatty should have written another paper dealing with his 'pigmy flints'—this time in 'Chambers' Journal,' under the title of 'The Home of the Pigmies.' Had the title been 'The Home of the Pigmy-flints' we might possibly have expected to have found the usual reference to the small flints found at Scunthorpe and the Vindhya Hills. With the title given, however, we naturally hoped that

* See also 'The Naturalist,' August 1903, p. 289.

something more definite had been arrived at, or at any rate that some new fact had been brought forward in support of his theory. But no, the same old story, rehashed, with just a little more 'spice' added. The article is also illustrated by the now exceedingly familiar sketch of the Scunthorpe and Vindhya Hills flints, reproduced at much less than actual size.* After dwelling on the fact that similar objects occur in England and in India, we find Mr. Gatty states 'The presence of various types in one locality is no sure proof that they were contemporary; and so far I think the evidences are in favour of crediting the pigmy-flint makers with being a distinct race. At any rate my own experience supports that idea, and the discoveries I made in North Lincolnshire are so extraordinary that I think there is little doubt about the matter.' Later, 'I think it would be fair to say that while collecting 2,000 *Anglo-Indian* pigmies [i.e., pigmy-flints!] I have got 50 neoliths.'

AN EARLY INDIAN INVASION.

Mr. Gatty thinks it would be unfair to his readers if he closed his paper without expressing his own views. 'From the top of the common, where the flints are found, you can see a few miles away the broad stream of the Humber where the Trent joins it. If [that little word!] a migration from India took place in Neolithic times, one could imagine the rude vessel of those days being rowed up with the tide, and disembarking its strange occupants near to where they could take up a position on the high ground. It is true the sandy and almost waterless common would offer poor accommodation and means of support; but we need not suppose they remained there for any length of time. I have shown that they moved on, at any rate, as far as the Pennine Range, and no doubt traces of them would be met with in other directions if people nowadays only used their eyes more. It requires, I know, sharp sight to detect a pigmy flint.' Mr. Gatty apparently has

* In the 'Field Naturalists' Quarterly' for May 1903 some 'Flint Implements from Scunthorpe, *Natural Size*,' are figured. The *same* implements are also figured in the recent paper above referred to. In the latter case, however, the drawings are *larger* than in the 'Field Naturalists' Quarterly,' but notwithstanding this, judging from a scale which accompanies them, they are only reproduced half natural size. No doubt our author will be having another paper on the subject, somewhere, when we trust we may see the 'Pigmy-flints' really reproduced *actual size*.

the 'sharp sight,' but it is nowhere compared with his imagination when he endeavours to account for the objects his sharp sight has detected.

A NEW THEORY FOR THE ROOS CARR IMAGE.

What a time these primitive Christopher Columbuses must have had in their little 'rude vessel.' We presume they would be so small that only a very limited supply of food and water would meet their requirements, the conveyance of which would not embarrass them. We feel sorry that the dug-out canoe figured in this journal for June was so very large. It was found at Brigg, only a few miles away from Scunthorpe, where the pigmy flints were found. Had it been the size of the model boat found at Roos Carrs, near Withernsea, it might have passed off as positive proof of this early Indian invasion. Perhaps Mr. Gatty has not seen the boat and images referred to. If not we should like to refer him to this journal for June 1903 in which they are figured and described. The figures are about 14 inches in height, and when first found were armed with 'pigmy' clubs and 'pigmy' shields, corresponding very well with the 'pigmy' flints from Scunthorpe. This Roos Carr boat, also, was found in 'what appears formerly to have been a creek or haven connected with the Humber.' What more proof could be desired? Many theories have been advanced as to the origin and significance of the Roos Carr Images. May they not be life-size representations of the beings who made the 2,000 Anglo-Indian pigmy flints Mr. Gatty has found? However, it is not for us to speculate. Mr. Gatty tells us that before he addressed the Anthropological Society in London he was warned to state facts, and not to speculate. Whether Mr. Gatty thought fit to take the advice or not, it seems to us to be good advice, and we must take it.

SHELLS.

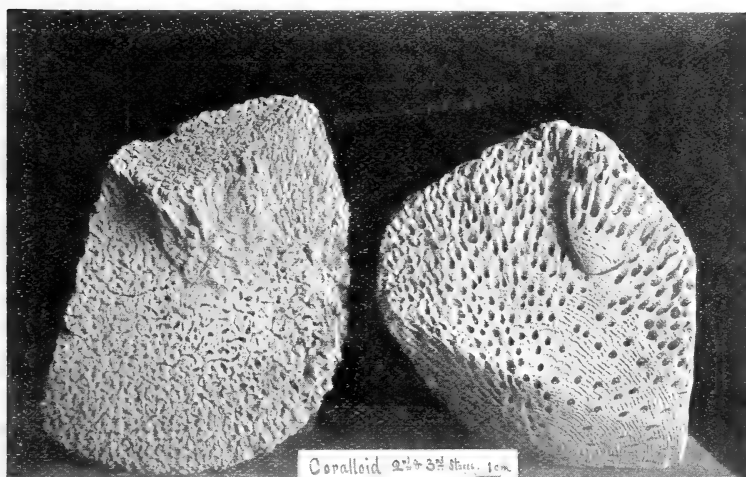
Louth Mollusca.—At the meeting of the Lincolnshire Naturalists' Union at Louth in June, Ackthorpe Wood yielded a damaged specimen of *Azeca tridens*; *Arion intermedius* occurred in abundance, and *Agriolimax leviss* and *Euconulus fulvus* were fairly plentiful. One example of *Balea perversa* was found, and although *Clausilia laminata* was fairly common, not a single example of *C. bidentata* was met with.—C. S. CARTER, Louth.

CONCRETIONARY CELLULAR LIMESTONE OF DURHAM.

G. ABBOTT, M.R.C.S., F.G.S.,

Tunbridge Wells.

It would be no easy task to decide which is the most puzzling of all the sedimentary rocks in the United Kingdom—at any rate to satisfy many geologists as to whether this or that had such a distinction. I venture, however, to put forward the cellular limestone, and do so without any hesitation. It has long been and still is a complete mystery as to how it was formed, and also from what kind of bed so large an amount of



Magnesian Limestone from Fulwell.

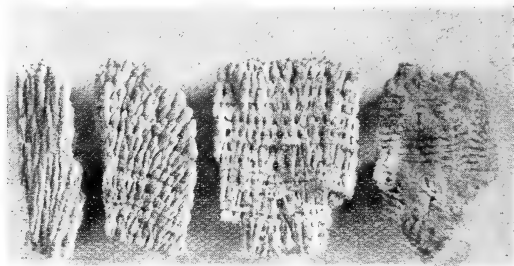
magnesia was derived. Geologists in the neighbourhood of Sunderland, and others also who have known it for many years, are unanimous as to this. They are also agreed as to the wonderful structure which it exhibits being entirely due to causes which are not associated with either animal or vegetable life.

The days of Eozoon are, I suppose, past and gone. We hear little of it now perhaps because it is no longer considered to be a fossil. Yet in resemblance to foraminifera, corals, etc., the cellular limestone is very much more astonishing and ought to be more widely known. Those who go to see these beds are

generally satisfied by inspecting the Cannon Ball bed at Roker, but wonderful as this is it is greatly surpassed in interest by the cellular structures seen in Fulwell, about a mile from it inland. These beds are at least 100 feet thick and some two square miles in extent, being evident on both sides of the river Wear. The best beds are seen in Fulwell Quarry, but they are being taken away at such an enormous rate (some third of a million tons annually), that in a few years they will be looked for there in vain.

A few theories have, it is true, been put forward from time to time to explain the wonderful variety of the patterns seen in the beds—these reach to several hundreds—yet not one theory has so far met with general acceptance.

Recent work on the copper and tin alloys by Messrs. Haycock and Neville has proved that in such dense things as bronzes the pattern *forms and alters after they have become solid.*



'Honeycomb,' Specimens in the Four Stages.

From all that I have seen during my long visits to Fulwell since 1897 I feel satisfied the key to the solution of this difficult problem lies in this direction, and I recognise that here segregation has gone a very long way beyond what geologists at present think possible.

We shall have in future to believe that some other force than crystallization (we want a name for it) has led to the development of its architecture in the form of rods, combs, tubes, gridirons, etc. The force is undoubtedly connected with the lime and not with the magnesia, the latter, however, acting as a very suitable matrix.

Words fail me to describe the beauty, variety, and fossil-like resemblance of the tons and tons of material to be met with in Fulwell Quarry.

The bed, as already hinted, is part of the Magnesian Limestone (Permian) which occupies an important position in

Yorkshire, yet as far as I know the same structures are not to be seen anywhere else in England, nor, I think, in the world!

Geologists as a rule take little interest in concretions, and this explains why these beds are so little known, yet to my mind many and valuable lessons, and, perhaps, many of the laws of segregation will be learnt from the study of the Cellular Concretionary Limestone at Fulwell.

THE CONCEALED COALFIELDS OF YORKSHIRE, DERBYSHIRE, AND NOTTINGHAMSHIRE.

PROF. P. F. KENDALL, F.G.S.

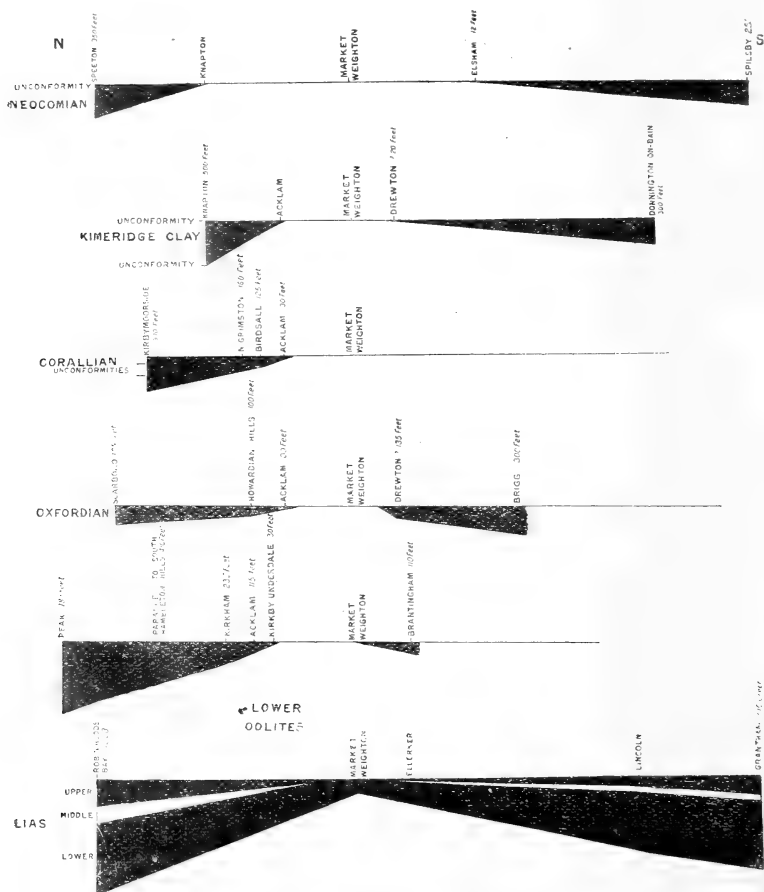
(Continued from p. 201.)

THE extension of the Charnian barrier in a south-easterly direction can be traced beneath a mantle of Triassic and newer rocks by two classes of evidence—that of bore-holes and shafts which, on a belt of country corresponding with the prolongation of Charnwood Forest, encounter early Carboniferous or yet older rocks immediately beneath beds of either Triassic, Liassic, or Oolite age—it has been proved as far as Bletchley, which is forty-six miles from the nearest visible outcrop of the Charnwood rocks. The second class of evidence is that of persistent folding. Nearly every division of the Secondary rocks older than the Chalk shows signs of contemporaneous or subsequent movement. Some, such as the Trias, Kimeridge Clay, and Lower Green Sand are almost or entirely absent on this line; others, like the Inferior Oolite and Gault, show signs of thinning and subsequent denudation, while others, like the Lias, along with some diminution give evidence of contemporary movement in planes of erosion; with water-worn fossils at various levels in the formation.

These signs mark the Charnian axis as perhaps the most unstable and persistently accentuating fold that has yet been recognised in Britain. In view of its persistence and magnitude and its proved relation to the edge of the coalfield between Nottingham and Leicester I find no escape from the conclusion that, so far as it can be traced, it will stand in the same relation to a deeply concealed portion of the coalfield that it does to the part which has been proved by boreholes at Ruddington and Owthorpe.

The *Northern Boundary* is formed by a persistent fold, in some respects more easy of demonstration than that on the south-east.

The Coal Measures along the whole length of the visible edge of the field (about twenty miles) rise against an anticline



Comparative Series of Sections showing the Variations of Thickness of the Jurassic and Neocomian Rocks in Relation to the Market Weighton Axis.

bringing up the Millstone Grit. This anticline can be followed to the eastward for a few miles under the discordant cover of Permian rocks, and then it and all other details of the structure are lost sight of beneath the featureless mantle of Drift and Alluvium which covers the Vale of York.

When examination is made of the rocks adjacent to the Chalk Wolds, however, it is found that exactly in line with the anticlinal axis of the Wharfe there is found the most remarkable gap in the whole geological succession of Yorkshire, the Chalk rests directly upon the Lower Lias. In other words, strata which in other parts of Yorkshire attain an aggregate thickness of close upon three thousand feet are here wholly unrepresented.

A study of the country north and south of this line shows the manner of disappearance of this great mass of deposits. Some dwindle away to nothing, by mere default of deposition, which might be ascribed to the elevation of the area as dry land at a particular period. Some were clearly wasted away by contemporaneous shallowing and scouring, and a third portion was removed by uplift and erosion of the area during the intervals between different periods of deposition. There is evidence of relative upward movement, repeated at intervals throughout the whole Jurassic (Liassic and Oolitic) period and continued into Cretaceous times.

This is a clear case of persistent folding, and as it occurs in direct alignment with the anticline which defines the northern edge of the coalfield I feel justified in projecting the boundary eastward under the newer rocks. The unconformity of the Chalk upon the Lias was proved as far east as Huggate in the year 1829, but I have not carried the margin of the Coal basin further than the foot of the Wold escarpment, as I think it probably meets there another line of deep-seated disturbance which forms the eastern boundary.

The Eastern Boundary.—This boundary of the coalfield is not nearly so easy of definition as those already dealt with, there is no outcrop of ancient rocks to aid, nor are there at present any borings of sufficient depth to throw a clear light on this obscure problem.

The chief evidence is found in an anticlinal fold in East Lincolnshire, which was discovered by the evidence of two boreholes subsequently to the completion of the geological survey of the district. This anticline which affects the Chalk and Lower Cretaceous rocks, runs in a north-westerly direction from the neighbourhood of the Wash through Willoughby and Alford up to Louth, beyond which it has not been traced, nor do I think it is traceable as a disturbance of the Chalk.

The question must now be considered: Is this a posthumous fold repeated after a long interval of geological time, upon the crest of a deep-seated fold which had affected the Carboniferous rocks?

A close analysis of the details of borings through the Secondary rocks reveals no tendency in them to thin out or disappear by unconformity in approaching this line; on the contrary, such evidence as is obtainable points to the directly opposite opinion, the Secondary rocks seem to swell out in that direction.

This, however, is not decisive—the Wealden anticline in the south of England and the Cleveland anticline in the north are both folds affecting the Chalk, and both appear to be reared upon pre-Permian folds (the Cleveland arch certainly is), yet both regions are areas in which Jurassic and Cretaceous rocks attained an immense development.

This testimony seems quite indecisive, but there are two facts which induce me to believe that the Willoughby anticline is the true boundary of the coalfield. The Coal Measures up to the eastern edge of the visible field are persistently dipping eastward, the boring at Haxey (South Car) shows, however, that not only is the thickness of Coal Measures above the Barnsley Bed less than it is in the pits on the same parallel further west, but also that the strata are ‘absolutely flat,’ or, in other words, are rising eastward relatively to the Permian rocks which cover them.

This may be quite a local arrangement, but, if not, it proves that Haxey lies to the eastward of the axis of the trough in which the Coal Measures lie. Further corroboration is furnished by the magnetic survey of Messrs. Thorpe and Rücker, which indicates a belt of high magnetic deviation coinciding closely with the direction of the Willoughby anticline. None of the evidence can be regarded as convincing if taken by itself, but I think that there is some cumulative value in the three distinct classes of testimony.

The chief practical importance of the demonstration is this: If the fold is a posthumous one, mining operations would cease in an easterly direction in consequence of the rising of the Coal Measures against an axis of older rocks, while if it be not a posthumous fold mining would cease at about the same line by the descent of the Measures below the limit (4000 feet) at which coal-working would be practicable or profitable. The question may perhaps find a decisive answer from a boring which is now being put down at South Cockerington, near Louth.

I should have preferred a site west of the anticline rather than east of it as more likely on any hypothesis to meet coal at a moderate depth; all the same it is a bold and apparently well-directed attempt deserving of success.

It will be observed that I have drawn my boundary line about six miles from the axis of the anticline, that was to allow room for a belt of Lower Carboniferous rocks, without any covering of Coal Measures on the crown of the fold as we find to be the case with the Pennine Chain. The caution may be superfluous for the Lincolnshire anticline is neither very broad nor very high.

The Southern Boundary.—I have already mentioned the general conclusions at which I have arrived regarding the position of the southern edge of the coalfield. I have sought in vain for signs of a fold or other structural feature which might indicate a limit to the coalfield in a southerly or south-easterly direction, anywhere north of the great depression of the Fens. South of that region, however, it is well known that a great mass of hard and ancient rocks occupies a great area under the London Basin. It has been proved in several deep borings, of which the nearest to the Fen Country of Cambridgeshire are at Ware in Hertfordshire, 38 miles from King's Repton, where I have drawn the boundary, and Culford, near Bury St. Edmunds, only eight miles from the beginning of the Fens at Mildenhall.

As in both of these cases rocks much older than the Carboniferous were encountered immediately underlying the Cretaceous rocks, it is certain that the coalfield cannot extend so far as these two sites. Some justification could be given for drawing the boundary line very near the actual edge of the Fens, but I have preferred to suggest a boundary well within that limit.

It is to be expected that a considerable and rather rapid rise of the Coal Measures will be discovered near the margin of the field.

[Detailed evidence is presented in a series of appendices.]

NOTES ON BIRDS OF THE EDEN VALLEY.

HARRY BRITTEN.

Salkeld Dykes.

(Continued from p. 208.)

CUCKOO. Abundant as a summer visitant to the Eden Valley.

WHITE OR BARN OWL. This beautiful owl is not as common as formerly, but it still breeds in a few favourite spots in the Eden Valley.

LONG-EARED OWL. This is a common resident in the Eden Valley; in fact, it is the most numerous species of owl in this district at the present

time. I have seen a good number of nests whilst searching for the nests of the Carrion Crow.

SHORT-EARED OWL. I have only met with this owl on one occasion. This was during the winter of 1896, when I came across a single bird in a large reed bed near the river Eden.

TAWNY OWL. This bird used to be very common but is now becoming decidedly scarcer. A number of its old nesting-sites have not been tenanted for several years, though it still breeds freely in the Eden Valley.

MONTAGN'S HARRIER. The late Rev. H. A. Macpherson, in the 'Victoria History,' says of this species:—'An adult male was killed near Edenhall.

BUZZARD. This bird is often met with in the Eden Valley during the winter months.

ROUGH-LEGGED BUZZARD. The late Rev. H. A. Macpherson records 'a fine bird trapped at Baron Wood in 1879.'

GOSHAWK. The late Rev. H. A. Macpherson says:—'An immature bird was shot near Edenhall while striking at a Woodpigeon.

SPARROW-HAWK. This hawk is a common resident in the Eden Valley. It often utilises the old nest of a Woodpigeon or Squirrel, but occasionally it will build its own nest, carrying sticks in a very energetic manner. If one of a pair of these birds is killed from a nest the survivor at once hunts up a new mate. I have seen this occur before incubation commenced, whilst they were still sitting, and also after the young were hatched. On one occasion I can remember the old hen being killed from a nest, and on climbing up to the nest found it contained five eggs; these were left undisturbed, and about ten days later it was found that another hen was sitting on this nest. She was shot and on once more climbing to the nest it was found to contain 11 eggs.

PEREGRINE FALCON. This fine bird is frequently seen in the Eden Valley during the winter months.

HOBBY. The late Rev. H. A. Macpherson records this bird from Edenhall.

MERLIN. This falcon is not uncommon in the Eden Valley. I have found the nest containing young birds on several different occasions, in the Parish of Great Salkeld.

KESTREL. This falcon is moderately common as a breeding bird in the Eden Valley.

OSPREY. The late Rev. H. A. Macpherson says, 'An Osprey was killed at Baron Wood in September 1869; this bird was caught in a pole-trap and recorded in the local papers as a Brown Eagle. Whin's pond at Edenhall has received the attention of Ospreys on several occasions; a fine female was shot there in the summer of 1848.'

CORMORANT. I have only met with this bird on one occasion in the Eden Valley, when my attention was drawn to a bird of this species by the persistent manner in which a large flock of Rooks were mobbing it, frequently causing it to seek safety in flight.

COMMON HERON. Is a common resident in the Eden Valley. A very fine colony is strictly preserved at Edenhall; a smaller colony exists on the Nunnery side of the Eden at Baron Wood. During the summer of 1904 a Heron was seen fishing in a small stream near Great Salkeld. It was seen to strike at something and carry it out on to the grass; on driving the bird away it was found to have secured a fine specimen of the Brown Rat.

SQUACCO HERON. The late Rev. H. A. Macpherson, in his 'Victoria History,' says, 'A specimen was shot out of a tree near the village of Kirkoswald in July 1845. It was shot by a Lazonby farmer. He appears to have sent it to the late Sir George Musgrave, for whom it was probably mounted by Philip Turner, of Penrith.'

HOW TO MAKE FIELD NOTES.

THE Rev. E. A. Woodruffe Peacock has recently issued an interesting pamphlet entitled, 'The Art of Field Observation, and Home Note Making,'* in which he gives some useful hints, which might profitably be acted upon, especially by young naturalists. All northern naturalists know how readily Mr. Peacock can produce particulars of his observations on almost any branch of natural history. His pamphlet explains how it is done. Much of it is occupied by particulars of plants and their relation to soils, etc., which he has dealt with previously. His concluding remarks, however, are so very useful that we have pleasure in quoting them, and can recommend those interested to read the lecture in full :—

'The actual work of making proper notes is simple enough. To use books of any kind for the purpose is not the best way. The single page of ordinary note-paper is the easiest, and still the most effective means yet discovered. It is used in this way. We all have our favourite books, even when we get others, and perhaps later works with fuller information. To mention a few names—Bell's 'Quadrupeds,' Saunders' 'Manual of British Birds,' and Adams' 'Collector's Manual of British Land and Freshwater Shells,' are some of mine. You want to make a note, we will say, about the Long-tailed Field Mouse (*Mus sylvaticus*).

'Take a half sheet of ordinary note-paper—which I keep ready by me for the purpose cut by machinery—and write the number of Bell's page, 293, in the left-hand corner. Follow in the same line with the Latin or English name, or both if you like. Underline these names, and in the right-hand corner add the figure 1, to signify that this is the first page devoted to this species. Then make your notes, carefully recording place, date, and fact, adding anything you consider important enough to notice. In this printed reproduction of the sheets of my Registers, the underlined parts are reproduced in italics.

293. *Mus sylvaticus*, Long-tailed Field Mouse. 1

Bottesford, Lincs. 7/11/1869. Dug out nest. It had a side-bolt. Acorns, nuts, and wheat were stored.

The same. 19/1/1870. Dug out nest in old Priory wall bank. Had stored acorns, beech nuts, and barley from field below.

Harrington, Northants. 8/7/1889. Young oaks springing up from deserted winter store in field by Larkland Wood. Is this the way oak woods extend? See also *Squirrel and Rook Notes*.

* 'Rural Studies Series,' No. 6. J. W. Goulding, Louth. 1s. See also 'Naturalist,' 1897, pp. 209-212.

Cadney, Lincs. 24/9/1893. Watched one through glass carrying wheat to its nest. It is rare here.

Newstead, Lincs. 12/12/1901. There is a nest on the old neolithic barrow facing causey.

247. *Corvus frugilegus*, Rook. 8

Harrington, Northants. 13/10/1887. Watched rooks in the act of taking the walnuts (*Juglans regia*) from the trees; and burying them in moss, or as frequently under or in the cakes of cow dung. I have observed them hiding acorns, too, in the same way years ago at Bottesford, Lincs.

The same, 21/1/1888. Rooks are busy now feeding on their hidden walnuts. The ground is lightly covered with snow. Is it luck or how do they find them again? How can they remember the exact spot? I can see nothing which can give the clue.

Cadney, Lincs. 12/5/1898. A pair have gradually emptied a partridge's nest on the North Carr Bank. They carried the eggs on their bills; and ate, or was it sucked, them on the road? 15/5/1898. Have found 13 eggshells, but can't be certain, even through glass, whether to call it eating or sucking—rather think it is a little of both.

The same, 11/1/1899. Rooks are busy in the snow finding the acorns we saw them burying in moss last autumn. Do the bents tell them where they are? They are the only things above the snow. Only *Cynosurus* and *Dactylis*, here and there, in Pulham Dale bybeck. They fight when they find one. They eat the corn, but always leave the husk.

75. *Helix Cantiana*, Kentish Snail (Lincolnshire Notes only). 3

Anchlome Drift, 2/2/1900. Plentiful. Its watershed must be rich in them in places.

Cleatham, 28/3/1900. Rare by roadside considering the Lincs. Limestone.

Bottesford, 5/1900. On Lower Lias. M. Peacock.

Hibaldstow, 17/8/1900. On cornbrash. Very fine indeed.

Scunthorpe, 20/8/1900. On the Ironstone Bed of Lower Lias; very thin and dark. Medium size. Fairly common.

Horncastle, 8/10/1900. Max Peacock. Soil?

Boston, 10/10/1900. On silt. Max Peacock.

Kirton Lindsey, 17/4/1901. In old quarry, Redbourne Road, not fine or plentiful—with *Helix itala*.

Ancholme, Cadney, at Thirty-Foot Drain outfall, bridge buttress, Oxford Clay and Peat. Broken by Thrushes. It is more plentiful than *Helix nemoralis* here; but not so greatly liked. The same, 13/8/1901. They were lying with *Helix hispida* and *Dreissenia polymorpha*, all collected by thrushes.

'These sheets from my Registers will give an idea how notes accumulate under the hands of a worker. I use deal cases for them, 12 inches long, 8 wide, and 3 deep, stained throughout, but only varnished on the outside. These boxes keep the sheets neatly together in the order of the left hand numbers; while at the same time they can be turned over like the leaves of a book to find any given note, after the index of Bell, of Saunders, or of Adams, has been consulted to give the right number. Should a page get damaged by mistake, or through accident, it can

easily be re-copied without injuring the look of the whole series of notes, as is too frequently the case where a book is used. It is also much easier to write on sheets than in a book. A simpler way still than using any author's order, or the index of his book, is to keep the notes in alphabetical order under the scientific name of the species. There is only one danger in doing this. The bi-nominal system of nomenclature is so uncertain, and various, in different authors, that many cross-references have to be added on other sheets, and this greatly swells the bulk of your notes. Yet, if this is not done with great care by young naturalists, notes on the same species will be scattered under different scientific names throughout his whole collection. When sheets may be reckoned by many thousands, as in my own case, dividing them into subjects becomes the only practical way of getting at what you want quickly.'

White Wagtails, etc., in Airedale.—On 9th April last, after a few days of cold (which included frost and snow), following a long spell of mild weather, I was struck with the great numbers of small birds down by the side of the river. No doubt most of them were driven into the valley for food and shelter. The Pied Wagtail (*Motacilla lugubris*) was by far the most numerous species, and simply swarmed the whole way between Saltaire and Bingley, the males very greatly predominating. In company with these Pied Wagtails, and near to Cottingley Bridge, I was delighted to see two White Wagtails (*M. alba*), which I watched for more than half an hour with my field glasses, and often at very short range. One (a male) was in exceptionally fine plumage. Again, on 12th April, one of these birds was still about the same place, and I was able to point it out to two friends interested in ornithology. Since that date I have not seen any more of these birds—which had probably sought the shelter of the valley with the same object as the vast gathering of Pied Wagtails. There does not appear to be any record of the White Wagtail in Airedale—or at least in this part of Airedale.* I have never known the beautiful Yellow—or Ray's—Wagtail (*M. raii*) so numerous in Airedale as it is this summer—the whole of the way up the dale from Saltaire to Malham.—HARRY B. BOOTH, Shipley.

* Although there has been good reason to suspect the presence of the White Wagtail in Airedale on the spring migration, this is the first authentic notice of its actual occurrence.—EDS.

MUSEUMS ASSOCIATION AT WORCESTER.

THE Annual Meeting of the Museums Association was held at Worcester from 11th July to 14th July. The various business meetings were held at the Guildhall, where the delegates were welcomed by the Mayor. All the subjects discussed were such as are beneficial to those in charge of museums. Particular mention should be made of Lord Windsor's presidential address, in which he was able to speak with some authority as to the value of museums. He pointed out that in the near future museums would become more and more important factors in the education of the country, and that, in connection with the National Institutions, he was pleased to be able to state that the Government was taking steps to enlarge and extend the usefulness of these institutions at an enormous cost.

Of particular service to Provincial Museums was the discussion which took place on the relation of such museums to the National Institutions. At this meeting representatives from the various National Institutions attended, and pointed out the ways in which they could be of service to the Provincial Museums. One important question was dealt with, namely, the instruction given to scholars at the museums. The question was raised as to the amount of time that was occupied in giving instruction to the scholars, as a result of which some of the Curator's ordinary duties must necessarily suffer. It was pointed out, however, that certain educational committees made a small grant of £25 or £30 to the museum, which enabled the latter institution to secure the services of a junior assistant, by whose help the routine work of the museum was not neglected. In view of this, such museums as were making a special point of teaching the scholars, decided to ask the education authority to make such a grant, as the complaint was pretty general that, desirable as the lectures were, they naturally interfered with the ordinary museum work.

In addition to the reading and discussing of papers, visits were paid to the Cathedral, and various old buildings and other places of interest in Worcester; to the Worcester Museum and Victoria Institute; to the Royal Porcelain Works; to Franche Hall, Kidderminster, where Mr. Tomkinson has an exceptionally fine collection of Japanese art; to Kempsey, where Sir Richard Temple exhibited his fine collection of Indian art and antiquities; and to Hewell Grange, where Lord Windsor had many objects of interest. Next year the Association visits Bristol.

A YORKSHIRE GLACIAL PROBLEM.

COSMO JOHNS, M.I.MECH.E., F.G.S.,

Sheffield.

THE Erratic Blocks Committee of the British Association described in their report for 1883 the very remarkable patch of Boulder Clay with erratics then being worked at Crosspool, near Sheffield. The place is about $1\frac{1}{2}$ miles west of the city on the ridge that divides the Rivelin and Porter Valleys. The striking feature of the deposit is the altitude, which is 730 feet; for the clay, which is now worked out, was of limited extent, and its depth did not exceed 12 feet. The hollow in which it lay, and to which it owed its preservation, is now partly filled in. The rocks here are Lower Coal Measures, with the Millstone Grit cropping out a little to the west.

The majority of the boulders found were Grits and Coal Measure Sandstones, but included among them was a remarkable assemblage of far-travelled rocks, many of them striated. Among those identified by Prof. Bonney were Quartz-felsite, Porphyritic tuff, Felstone, Quartz-felsite with Hornblende, Felsite, Indurated tuff, decomposed tuff, grey Magnesian Limestone, Felstone with vein stuff, slaty rock, Felstone without quartz, vesicular Felsite, Rhyolite, Quartzite, Carboniferous Chert, Porphyrite, Tuff and Porphyritic Ash. There was much Magnesian Limestone and many boulders of Red Sandstone.

A glance at the list indicates a Lake District origin for some of the rocks and the general character of the series rather suggests the Vale of York glacier. Still, there is nothing against the view that the Teesdale ice, after being diverted by the Scandinavian, ran along its face, and that it was this British fringe of the foreign ice that laid down this deposit. When, however, we consider its altitude and the lie of the neighbouring land, the problem becomes somewhat complicated, for it is difficult to imagine a tongue of ice being pushed up longitudinally along this ridge without having filled the two valleys and interfering with the drainage. But both these valleys are free from drift with the exception that a large Felstone boulder was found much lower down in the Porter Valley. That the deposit was much greater in extent originally is very probable, and that the deposit we are now discussing is but the relic left after the denudation that removed the rest is a reasonable conclusion. It is the almost complete obliteration of the evidences

of ice action in the rest of the district that is most remarkable, especially to those who have tramped through the clean cut overflow valleys of Cleveland and the Hambleton Hills. It is hard to believe that the evidence in the two extreme ends of the county must be ascribed to the same period.

This, of course, suggests that the glaciation of the North of England may have been a more complex affair than we had been led to believe. Evidence is beginning to accumulate which tends to indicate that there may have been an inter-glacial period of some sort. That is, there was some disturbing or modifying influence at work, on the removal of which the numerous ice sheets had changed their direction of flow and carried a different assemblage of erratics. A hint of this was given many years ago when the late Prof. Green described the Barnsley Boulder Clay. Here we had two distinct beds with a difference in the included boulders. Mr. J. W. Stather's investigation of the vertical range of the Cheviot and Carboniferous Limestone erratics in the East Yorkshire Boulder Clay indicated a very great difference between the upper Red Clay and the lower hard ash-coloured clay, while the eroded surface of the lower bed, with its overlying clay, gravel, and sand, on which the Red Clay rests, is very suggestive. Recent cuttings in the Derwent Valley, Derbyshire, disclosed several interesting sections showing an upper red bed and a lower purple Boulder Clay, each with its characteristic erratics. This evidence of a break and change in the glacial conditions is too widespread to be ignored.*

For the solution of the problem we can only review the somewhat limited data available. (1) We have the Crösspool erratics very suggestive of a connection with the Vale of York glacier. (2) The almost entire absence of drift in the district S. and S.W. (3) Occurrence of erratics of a similar character towards the N. and N.E. This all points to the deposit having

* It must be borne in mind that whilst there unquestionably is evidence of one or more divisions in the glacial series, representing different conditions of ice-flow, etc., it does not necessarily imply the existence of an Interglacial Epoch, i.e., a distinct warm period between two separate and distinct Glacial Epochs. At present the view generally accepted is that put forward by P. F. Kendall in Wright's 'Man and the Glacial Period,' viz., that the so-called Inter-glacial beds can be accounted for on the assumption of one Ice Age, during which there were many oscillations in the movement of the ice-front, some quite possibly being of very long duration. Additional evidence may, of course, necessitate a change in this view.—EDS.

been formed during an early prolongation of the Vale of York glacier. But this does not explain the great height, 730 feet, or the marked absence of drift in the neighbourhood. It is rather suggestive, however, that drift is found even still higher in the Derwent Valley, in Derbyshire, near Crich, and though it is very certain that there was no connection between the two ice streams, and also that the moorland and valleys between are quite driftless, yet the similarity in that both reach abnormal heights may be due to the same cause. It would be interesting to know where the Scandinavian, Vale of York, and Derbyshire ice streams met. For a time, and until they coalesced, there must have been a piling up of the ice at the points where the streams met, and the thickening indicated by the high level drift might well have resulted from the meeting of such opposing streams. If so, then in this direction is to be found the solution of the difficulty that confronts one both at Crosspool and Crich. Of one thing we can well be certain; everything that occurred was the result of the working of natural laws familiar to us all. Ice does not start climbing up hill sides unless it is pushed from behind. The energy that carried the Crosspool erratics to the spot where they were found was transmitted through the winding glacier from the lofty ice cap that fed it. All we need is more data, and until that is obtained it will perhaps be better to consider the Crosspool enigma as one of the unsolved problems that must be kept in mind when we start theorising about the glacial history of Yorkshire.

BIRDS.

Rare Birds Nesting near Filey.—In June I was fortunate in finding the Stonechat, Teal, and Red-legged Partridge nesting near Filey. Several pairs of the latter birds are now established there.—R. FORTUNE, Harrogate.

Large Guillemot Egg from Bempton.—At the excursion of the International Ornithological Congress held at Bempton, on 21st June, Mr. W. Wilkinson, one of the 'climbers,' obtained a double-yolked egg of the Guillemot. It is of the common variety as regards colour, namely, the blue background with black streaks and marks upon it; Wilkinson considered it to be one of the largest eggs obtained from the Bempton cliffs. It measures $3\frac{5}{16}$ inches in length, $2\frac{5}{16}$ inches in width, and weighs precisely 6 ozs. It was secured for the Hull Municipal Museum.—T. SHEPPARD, Hull.

YORKSHIRE NATURALISTS AT LOFTUS,

8th-10th JULY 1905.

A PLEASANT and profitable week-end was spent in Cleveland on the occasion of the 188th meeting of the Yorkshire Naturalists' Union. Several members arrived at the Golden Lion Hotel (the headquarters for the meeting) on Friday night, and the party was considerably augmented on Saturday, especially by the members of the Cleveland Naturalists' Club.

The Liverton ironstone mine, remarkable for the up-to-date nature of the machinery, etc., was first visited, after which the party divided. The botanists were under the guidance of Dr. W. G. Smith, and investigated the Kilton and Loftus Valleys. Messrs. T. A. Lofthouse and M. L. Thompson accompanied the entomologists, and Mr. K. MacLean was responsible for vertebrate zoology.



Cliff Section, Staithes to Saltburn.

The geologists, led by Messrs. J. J. Burton and J. W. Stather, followed the Kilton Beck to the coast, and then traversed the beach round Hummersea Bay to Rockcliffe and Boulby Point, and on to Staithes. Many interesting objects were noticed on the ramble. After dinner the whole party visited the disused alum quarries at the top of Boulby Cliffs, where Ammonites and other characteristic Liassic fossils were found in great profusion.

On the following day the party was conveyed by wagonette to Marske, viâ Saltburn, to examine the plant bed exposed in the quarry on the northern face of the Upleatham outlier. This is the section described by the late J. Hawell in this journal for August 1903 (pp. 312-317). Botanists and geologists alike secured many fine examples of *Williamsonia*, *Tæniopteris*, etc. The evening was occupied in a discussion as to the original source of the iron in the Cleveland Iron Ore. It was decided to recommend to the Executive Committee of the Union that the

Cleveland district be visited again next year, and that specialists be invited to read papers on this subject.

On Monday many members returned to their homes. Those remaining visited the subterranean workings of the Liverton Mine, under the guidance of Messrs. J. J. and G. A. Burton, and in the afternoon continued their investigations in the district.*

For Geology Mr. J. J. Burton writes:—On Saturday morning the geologists first visited Liverton Mines, where they were shown the surface operations connected with the winning and cleaning of ironstone from the *A. spinatus* zone in the upper part of the Middle Lias, here situated at a depth of 480 feet from the surface, and several characteristic fossils were obtained.

From thence they descended by way of the ravine down Skinningrove Beck to the beach, passing over deposits of Boulder Clay which forms the principal surface covering of the sides of the valley. The time of the visit having been chosen to suit the state of the tide, the rocky bed of the sea above low water was found to be fully exposed and afforded much interest. The surface beds first examined belonged to the *Ammonites capricornus* zone of the Middle Lias; proceeding eastward over which a big deposit of Boulder Clay was noticed, practically filling up Hummersea Bay and reaching down to high-water mark. Still continuing eastward, the strata were found to rise and the floor of the seashore was formed of Lias shale of the *A. jamesoni* beds, which, according to modern classification, are the lowest but one in the Middle Lias series. This portion of the coast was found especially interesting, as the cliffs here tower up to a height of over 660 feet and show on their perpendicular faces the various beds of dogger, shale, sandstone, and nodules of which the Middle and Upper Lias are composed, with a heavy cap of Oolite cut back to expose the alum shale during the prosperous times of the alum industry, which here flourished for a long time, employing many hundreds of men, until chemical process cheapened the cost and made the burning of shale to obtain sulphate of alumina one of many vanished industries. These old alum workings were subsequently examined, but it may be here stated that the *A. communis* zone which forms the alum shale is the top series of beds of the Upper Lias, and is at this point about 107 feet thick, but thickens nearer the Peak,

* For detailed report of this excursion see 'Yorkshire Observer,' 11th July.

where it is computed to be 150 feet thick. The shale was burnt and the alum obtained by dissolving out the sulphate and clarifying and crystallising the liquid, the burnt refuse being thrown over the cliff, where now for miles along the coast red shingle tinges the shores; sometimes it forms the only walking space and gives the pedestrian cause to slacken pace and mop his brow. Below the Alum shale lie in successive order the *A. serpentinus* zone or Jet shale, about 47 feet in thickness, the *A. annulatus*, *A. spinatus*, *A. margaritatus*, *A. capricornus*, and *A. jamesoni* zones, the latter being the lowest rock exposed during the visit.

The famous Cleveland Ironstone is found, as already said, in the *A. spinatus* zone, and is spread over a large area. In the Eston and Upleatham district it exists as one thick block, but proceeding southward and eastward a wedge of shale splits the seam into two portions, and as the wedge thickens the one seam of stone at Eston becomes two distinct seams with, as here at Rockcliffe, a top block and a bottom block, between which layers of shale and impure ironstone of several feet in thickness are interposed.

In the *A. jamesoni* beds the most interesting find was eight or ten bones of one of those huge saurians which in Liassic times inhabited the seas. These remains were embedded in the shale and part of the bones protruded above the surface, having been exposed by the wasting action of the waves on the soft shale. It is quite probable that much more of the animal's remains are still covered, and the local geologists have arranged to attempt to procure the slab containing them as intact as possible and deposit it in the Dorman Museum at Middlesbrough. Another very interesting find near to, although not in situ was a single vertebra of what must have been a saurian of tremendous size; the vertebra measured 13 inches in diameter, and was still surrounded by a considerable covering of shale. This, too, it is hoped to be able to send to the Dorman Museum.

All along the coast in this neighbourhood the foot of the cliffs is more or less protected by big blocks of stone which have fallen from above and form a kind of breakwater, arresting the eroding action of the sea, as the waves dash themselves to spray before reaching the base of the cliffs; but here and there, where no such protection exists, and where the sea has worn out of the headland little bays, its scooping and cutting action is well seen in the indented line of coast and the partially isolated columns of rocks which have been carved out. Another

very marked feature is the curious forms into which the waves have worn many of the blocks dotting the beach. These are blocks or slabs of hard material resting on or bedded in the softer clay shales, and as the latter have become exposed the sea has cut them away at a greater rate than it has the harder superincumbent rock and formed tables and mushrooms and perched blocks of all sizes and shapes and at curious angles of inclination.

The erosion of the coast, although considerable, is less than might be expected when compared with other portions of the east coast. The explanation is probably the one already given of the protection of the base of the cliffs by big masses of fallen rock, coupled with the fact that the dip of the strata here is for the most part inland and there is no slipping away of the uppermost strata.

Not daring to dispute with the tide possession of the strip between the inaccessible cliffs and low water mark the party had to hurry on and leave reluctantly behind much which would have well repaid investigation. Towards Staithes the rocks begin to dip east and south until the *A. capricornus* beds are again exposed, and at Staithes the *A. margaritatus* zone comes down to the sea level. Here the party left the shore, and climbing the steep and stony, but picturesque if somewhat fishy-smelling, streets of Staithes, perched on the sides of the cliffs in a sheltered cove, they made their way back to Loftus by train.

On the following day the geologists visited the plant bed in Marske Quarry. The fossil plants are found in a thin fissile bed of ironstone and also in the soft friable clay shales several feet in thickness immediately overlying the hard bed of ironstone.

The beds are very full of plant remains of the genus *Dictyo-*
samites, and have been fully described by the late Rev. John Hawell and by A. C. Seward, Esq., F.G.S., and are placed by those geologists low down in the Estuarine Series.

A considerable number of specimens was taken for further examination.

Mr. J. W. Stather adds:—The country round Loftus is exceedingly well supplied with Glacial drift and boulders, but good sections appear to be scarce. During the walk on the beach from Skinningrove to Staithes the lofty cliffs were seen to be capped with red Boulder Clay, which increased in thickness towards Staithes.

Of the larger boulders on the beach by far the most numerous were the Basalts, and among the smaller foreign pebbles the Porphyrites of the Cheviot and South Scottish types were decidedly in the ascendant. Four boulders of Shap Granite were noticed and two pebbles of Rhomb-porphry occurred in Hummersea Bay. On the other hand, the Carboniferous rocks, which figure so largely among the boulders on the coast further to the south, were here remarkably few and far between.

For Vertebrate Zoology Mr. K. MacLean reports:—During the greater part of the day the heat was so intense a great many birds hid themselves away in the shady nooks and corners, but those of us who were able to get about during the early morning and in the evening had better opportunities of observing bird life.

A noticeable and interesting feature of the excursion was the number of young birds flying with their parents. Nearly all the Willow Wrens were found in parties of from seven to ten. The Flycatchers, Wagtails, Tits, and Goldcrests were also seen in families, and a pair of Jays with their young ones 'just out' were seen sporting themselves amongst the trees in the Kilton Woods. It is to be hoped their days will not be shortened by the leaden hail which proves so fatal to the bulk of their family. May the keepers be merciful and leave us poor naturalists a few specimens of interest and beauty.

We also saw a fine family of Kestrels which had evidently just come out of the cliffs. There were five fine young birds, and the parents were hovering round, watching with pride their beautiful children in their gyratory flight.

Several Curlews had already left their moorland homes, and were seen amongst the weed-clad rocks at low tide. Many Black-headed Gulls were also there feeding amongst the Herring Gulls.

Cormorants were frequently seen popping out of the water, and as suddenly disappearing in their submarine excursions in pursuit of their scaly prey.

A Diver was also observed. It was too far off, however, to ascertain to what species it belonged; but it was probably an immature specimen of the Red-throated Diver (*Colymbus septentrionalis*). Almost double the number of birds we generally see on these excursions was observed during the three days, and if we had had time to visit the moors in the immediate neighbourhood, no doubt we should have added largely to the list.

LIST OF BIRDS OBSERVED.

Willow Wren.	Corn Bunting.	Bullfinch.
Yellow Bunting.	Spotted Flycatcher.	Dipper.
Starling.	Pied Wagtail (family).	Golden Plover.
Sparrow.	Pied Flycatcher (family).	Wild Duck (<i>Anas boschas</i>).
Tree Sparrow.	Yellow Wagtail (family).	Curlew.
Blackbird.	Grey Wagtail.	Cormorant.
Thrush.	Blue Tit.	Corn Crane.
Missel Thrush.	Great Tit (family).	Cuckoo.
Chaffinch.	Cole Tit (family).	Brown Linnet.
Greenfinch.	Long-tailed Tit (family).	Stone-Chat.
Common Wren.	Goldcrest (family).	Whin-Chat.
Whitethroat.	Blackcap Warbler.	Common Gull.
Lesser Whitethroat.	Redstart.	Herring Gull.
Meadow Pipit.	Robin.	Black-backed Gull.
Tree Pipit.	Hedge Sparrow.	Diver sp.?
Swallow.	Pheasant.	Black-headed Gull.
Sand Martin.	Magpie.	Heron.
House Martin.	Partridge.	Carriion Crow.
Swift.	Ring Ousel.	Rook.
Sedge Warbler.	Jay (and family).	Lesser Redpoll.
Jackdaw.	Wood Pigeon.	Tree Creeper.
Garden Warbler.	Rock Pigeon.	Chiffchaff.
Wood Wren.	Stock Dove.	Wheatear.

MAMMALIA.—A very fine Otter was exhibited in a window which had been killed in a small stream, called Waitel Beck, a month or two ago. Several others had been seen in the neighbourhood. Stoats, Weasels, and Hedgehogs were amongst other victims in a gamekeeper's museum; and we observed alive:—Rabbit, Hare, Squirrel, Water Vole, Shrew, Wood Mouse, Rat, Field Vole, and Mole.

REPTILE.—Common Lizard.

AMPHIBIA.—Frog and Toad.

FISHES.—No note was taken of the sea fish, which would require more lengthy observation. In the streams we noticed Trout, Minnow, and a number of Smolt which had not yet gone out to sea.

For general Entomology Mr. T. A. Lofthouse writes:—Although the weather conditions were apparently favourable, it being hot and sunny, Kilton Woods, the ground visited by the entomologists (of whom there were members present from Hartlepool, Sheffield, and Middlesbrough), proved on the day to be most unsatisfactory, and not at all in accord with my previous experiences on this ground at about the same time in other seasons. Upwards of thirty species were noted, many of

them only single specimens and mostly common species. Among the best of those noted were:—

<i>Anthocaris cardamines.</i>	<i>Hypermercia augustana.</i>
<i>Epinephele hyperanthus.</i>	<i>Ephippiphora brunnichiana.</i>
<i>Asthena blomeri.</i>	<i>Olindia ulmana.</i>
<i>Eupisteria oblitterata.</i>	<i>Argyrolepiea chicana.</i>
<i>Melanippe albicillata.</i>	<i>Glyphipteryx cnadiella.</i>
<i>Coremia designata.</i>	<i>Argyresthia pygmæella.</i>
<i>Cidaria populata.</i>	<i>Pterophorus trigonodactylos.</i>

COLEOPTERA.—Mr. M. L. Thompson reports having met with the following beetles along the route in Kilton Wood:—

<i>Nebria glylenhali</i> Sch.	<i>Malthinus punctatus</i> Fourc.
<i>Bembidium atroceruleum</i> Steph.	<i>Dryophilus pusillus</i> Gyll.
<i>Bembidium littorale.</i>	<i>Malthodes marginatus</i> Lat.
<i>Tachyporus obtusus</i> L.	<i>Malthodes minimus</i> L.
<i>Stenus guttula</i> Müll.	<i>Crepidodera transversa</i> Marsh.
<i>Anthobium minutum</i> F.	<i>Plectroscelis concinna</i> Marsh.
<i>Anthobium ophthalmicum</i> Payk.	<i>Anaspis maculata</i> Fourc.
<i>Anthobium torquatum</i> Marsh.	<i>Otiorrhynchus picipes</i> F.
<i>Coccinella 10-punctata</i> L.	<i>Polydrusus pterygomalis</i> Sch.
<i>Halyzia 14-guttata</i> L.	<i>Phyllobius calcaratus</i> F.
<i>Meligethes æneus</i> F.	<i>Phyllobius argentatus</i> L.
<i>Byturus tomentosus</i> F.	<i>Phyllobius viridieris</i> Laich.
<i>Athous vittatus</i> F.	<i>Liosoma ovatum</i> Clair.
<i>Agriotes pallidulus</i> Ill.	<i>Orchestes salicis</i> L.
<i>Telephorus bicolor</i> F.	<i>Dorytomus maculatus</i> Marsh.
<i>Rhagonycha limbata</i> Thoms.	<i>Dorytomus pectoralis</i> Gyll.

Spiders were noticed to be particularly numerous on the shale heaps at Boulby. On a specimen being submitted to the Rev. O. Picard Cambridge, that gentleman states:—‘It is *Trochora picta* Hahn. ♀ immature, an abundant and widely dispersed species, though local, and certainly our handsomest Lycosid.

Dr. W. G. Smith writes:—Loftus was a suitable centre for examining the numerous woods and the coast vegetation of Eastern Cleveland. The excursion to the Kilton Valley gave opportunity for seeing one of the best of the valley woods. Oak and Ash are everywhere the most abundant trees, although Scots Pine, Larch, and Spruce have been abundantly planted. The woods are well maintained, as is the rule in the North Riding, which is far ahead of the West Riding in this respect. The woods on the Grinkle estate are chiefly coniferous and are worked in a manner likely to provide a large quantity of useful timber. The variations of the trees in the plantations are reflected in the undergrowth; one plantation of old conifers was seen absolutely devoid of undergrowth, while in the open

oak woods there was an abundant and varied ground carpet. The coast was visited from Runswick to Saltburn. After two months of severe drought, the vegetation was not at its best. One feature is the marked distinction between the Boulder Clay slopes at Runswick, Port Mulgrave, and Hummersea, and the adjoining dry slopes of Oolitic and Liassic weathered rocks. The Boulder Clay is grassy and supports a large variety of species of other plants. The dry, sandy, and shaly slopes are covered with Bracken, Purple Bell Heath, Heather, and other plants of poor soil liable to drought. The abandoned alum works at Boulby showed the development of a plant-covering on bare soil; at present the grass, *Aira flexuosa*, forms an open association of isolated tufts on the older banks, the Bird's Foot Trefoil also forms large, yellow, conspicuous patches, while the Ling and Purple Bell Heath are well-established in moist hollows.

BOTANY.—From a list of 87 plants observed in and around Kilton Woods, kindly supplied by Mr. T. J. Cozens, of the Preston Grammar School, the following are the more noteworthy :—

Hypericum Androsæmum.

Hypericum elodes.

Vicia sylvatica.

Lathyrus macrorrhizus.

Epilobium parviflorum.

Lactuca muralis.

Carlina vulgaris.

Campanula latifolia.

Salvia verbenaca.

Myosotis sylvatica.

Daphne Laureola (in fruit).

Epipactis latifolia.

Carex pendula.

T. S.

FIELD NOTES.

MITES.

Lincolnshire Water-mites.—At the meeting of the Lincolnshire Naturalists' Union, held at Stamford, on 29th June, a sample of water from an old pond on the disused brick hills was taken. The contained water-mites have been referred to Dr. George and are as follows:—*Arrhenurus globator*, both sexes, and some small green *Arrhenurus* not easily determinable; *Curvipes* = *Piona* (of Piersig.), *Limnesia histrionica*, *L. kaenikii* (?), *Hydrochoreutes*. The largest male was accidentally lost before the examination was concluded. It had a curious deformed palpus on one side, the like of which the examiner had not seen before. Dr. George is preserving the specimens, about 66 in all, for further examination.—ARTHUR SMITH, Grimsby.

SHELLS.

***Cyclostoma elegans* at Lincoln.**—A few weeks ago, when walking through a tramway cutting at the ironstone workings north of Lincoln, I found *Cyclostoma elegans* fairly common in the limestone rubble at a depth of from one to four feet below the surface. Within the past few days I have again found this beautiful land shell in limestone rubble dug out of post holes on the river bank at Little Ponton. In the latter case they are quite numerous and in fine condition, some having the operculum in position. From the débris of two holes, each about one foot square and two feet deep, I picked up 18 specimens. I believe that *C. elegans* has only been found in one locality in Lincolnshire in a living state, and that the one for which Dr. Martin Lister recorded it in 1678—Burwell Wood—and rediscovered in 1886 by H. Wallis Kew, F.Z.S. We have now eight localities where the dead shells have been found.* Why is this? Evidently at some earlier period this land mollusc was quite common. In dry weather it buries itself in the soil. Have the seasons been so dry that the animal, after burying itself in its usual fashion, has been unable to propagate its species; or have the climatal conditions changed and become unsuited to so delicate a species?—HENRY PRESTON, Grantham.

[*C. elegans* is difficult to find, especially in dry weather. It is not improbable that the species still lives in many of the localities cited by Mr. Preston.—EDS.]

◆◆◆

FUNGI.

New Yorkshire Mould: *Myxotrichum deflexum* Berk.—While visiting Woodhall, Copley, near Halifax, with the local Antiquarian Society on 8th July, this interesting black mould was met with. The ancient residence is at present untenanted and becoming somewhat dilapidated, especially in the interior. The mould was found in quantity on the rotting canvas backing of the wall decoration in one of the rooms. It differs from *Myxotrichum chartarum* in having no sterile hyphæ with curved tips, neither are the branches of the fertile hyphæ dichotomously branched as in that species.—C. CROSSLAND, Halifax, 15th July 1905.

* The localities, besides the two named, are:—Well Vale, Alford, 12th June 1890, J. B. Davy; Swaby, October 1891, J. B. Davy; Jericho Plantation, Farforth, August 1902, C. S. Carter; Steingot, west end of Withcal tunnel, May 1904, C. S. Carter; Whalebone Lane, Little Ponton, May 1903, H. Preston.

REVIEWS AND BOOK NOTICES.

In the 'Pen Portrait' in the June 'Yorkshire Notes and Queries' is an account of the doings of the curator at the Hull Museum.

The late W. Ackroyd (Halifax) contributed a note on the 'Luminiferous Ether' as an Element to the 'Chemical News' (Vol. 91, No. 2,355).

The 'Annual Statement of the Geological Society of London for 1904' shows 'balance in favour of the society £12,539,' which amount does not include the value of stock, collections, etc.

The 'Fifteenth Report of the British Association Geological Photographs Committee' includes particulars of a fine set of Yorkshire photographs by Messrs. W. Jerome Harrison and Godfrey Bingley.

Under the title 'Where Shall I Spend My Holidays,' the Bootle Public Library has issued a penny pamphlet giving 'some aids to a decision (Topographical, Antiquarian, Literary).' It contains a classified list of 'Books and Maps in the Central Public Library [Bootle] relating to Holiday Resorts within the British Isles.' It has been compiled by Messrs. C. H. Hunt and W. T. Montgomery.

The 'Report of the Corresponding Societies' Committee of the British Association' is of particular value to Natural History Societies. In addition to a record of the Committee's year's work, it has a list of the papers published in the Transactions, etc., of the various societies connected with the Association. It can be obtained from the offices of the Association, Burlington House, for one shilling.

'The Fifty-second Report of the Nottingham Naturalists' Society, for 1903-4,' has just been received. In addition to the Rules, Balance Sheet, List of Members, etc., it contains two useful contributions by Prof. J. W. Carr, viz., 'Nottinghamshire Arachnida' and 'Nottingham Natural History Notes for 1903-4.' In the latter the more interesting records of mammals, birds, reptiles, plants, algæ, etc., are enumerated.

The 'Twelfth Quarterly Record of the Hull Museum' (Publication No. 24) contains several illustrated articles dealing with local antiquities. Amongst the subjects treated are:—'The Dandy Horse,' 'Lights of Other Days,' 'British Gold Coins,' 'Old Spinning Wheels,' 'Old Archery Clubs,' 'Wilberforce Relics,' 'Derby Bisque Ware,' as well as numerous shorter notes. The publication is sold by A. Brown & Sons, Hull, at one penny.

'The Science Year Book, Diary, Directory, and Scientific Summary, 1905' (King, Sell & Olding, London; 5s.) is a most useful annual, and should be on the desk of every scientific man. It is particularly useful to those interested in Astronomy, Meteorology, etc. A valuable feature is the Summary of Science Progress, under various heads and by well known authorities. There is also a Biographical Directory, Diary, etc. As part of the year has now elapsed, we notice the publishers are offering the remaining stock at 2s. 6d. Buy it.

Mons. A. Doigneau has issued a useful volume dealing with Pre-historic Archaeology. It is entitled 'Nos Ancêtres Primitifs,' and is published by C. Clavreul, of 2, Rue de Furstenberg, Paris, at 5 francs. It contains a useful and carefully-compiled summary of our present knowledge of the pre-historic remains in France. The first chapter deals with the general question of the antiquity of man; then follows a series of chapters dealing with the various phases of progression in man's handiwork from the eolithic to the neolithic periods. The several types of implements represented in our neighbouring country have been classified in a more elaborate method than those of Britain, as shown by the writings of Prestwich, Lyell, Lord Avebury, and others. These types are carefully figured and described in the present work. Unfortunately it has no index, and the paper wrappers do not escape the effects of postal transit so well as a stronger cover would.

NORTHERN NEWS.

On Plate XVI., and on page 217 in the July 'Naturalist' or Charles Street read James Street.

Prof. E. Ray Lankester will preside at the meeting of the British Association at York next year.

Mr. W. Mansbridge contributes a note on 'Tortrices in the Liverpool District' to the April 'Entomologist.'

A melanic form of *Larentia multistrigaria* is recorded at Birtley, Durham (Entomologists' Record, May).

Mr. B. Hobson writes 'On a Displaced Mass of Chalk on the Foreshore of Speeton Cliffs' in the June 'Geological Magazine.'

Mr. J. M. E. Bowley, who for twenty-five years has been curator of the Sunderland Museum, is retiring on account of ill-health.

An example of early nesting of the Dipper is recorded at Carlisle. Four young ones were hatched on 13th March ('Zoologist,' May).

The Bradford Scientific Association has issued an attractive pamphlet containing particulars of the 'Summer Excursions and Visits to Works, 1905.'

The Manchester Microscopical Society continues to issue its useful circulars, in which the work of the Society in its various branches is set forth.

Mr. Richard South will superintend the publication of the remaining manuscript of the 'Lepidoptera of the British Islands,' by the late C. G. Barrett.

The 1904 (Cambridge) Report of the British Association has been issued, and in its 1,132 pages contains much information of value to northern naturalists.

The 'Annual Rainfall Register at Pothole, Spalding, from 1829 to 1903,' has been presented to the library of the Spalding Gentlemen's Society by Mr. A. Harrison.

A Sturgeon, weighing 16 stones, and measuring 8 ft. 10 in. in length, and 37 in. in greatest circumference, was caught in the Ouse, near Goole, on the 19th June.

In the 'Strand Magazine' for May, Mr. E. J. Cornish has an admirable illustrated article on 'How the Birds Come,' which deals with the question of bird migration.

Mr. A. Renton, of Otley, a sportsman and naturalist of some repute, who had a large collection of stuffed birds and mammals, died on Saturday, 6th May, at the age of 55.

The July 'Entomologists' Record' contains 'Notes on the Melanism of *Larentia multistrigaria* in the Neighbourhood of Huddersfield,' by Mr. B. Morley, to which the Editor adds a note.

In the Journal of the Manchester Geographical Society for April-June 1904 (issued April 1905), Mr. H. C. Martin contributes an interesting paper entitled 'The Isle of Man and its Beauty Spots.'

The Bowes Museum, Barnard Castle, has recently been awarded £142,000 by the Court of Chancery. The Museum, which was founded in 1870, can now be completed and properly maintained.

The 'South-Eastern Naturalist,' the annual organ of the 'South-Eastern Union of Scientific Societies,' contains a 'List of Localities not recorded in recent Floras of Kent and Surrey, for some comparatively rare plants!' The localities are given in detail. Evidently our southern contemporary has every faith in its readers.

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NOTES AND COMMENTS.

THORNE MOOR IN EARLY TIMES.

In the recently issued 'Transactions of the East Riding Antiquarian Society,'* the Rev. C. V. Collier has a valuable paper on 'Stovin's Manuscript.' This manuscript was written early in the eighteenth century, and in addition to containing particulars of Thorne Moor and Hatfield Chase as Stovin found it, includes extracts from earlier records. For instance, 'Prince Henry of Wales is stated to have visited the Chase in 1609; whereat His Royal Highness and his retinue turned out at Tudworth for the Chase, not on horseback with hounds and horns, but, attended by a numerous assemblage, they embarked in about 100 boats, and having had driven from the neighbouring woods some 300 deer which took to the water, the little navy of sportsmen pursued their game into Thorne Mere, and there some of the party going into the water, and feeling such and such that were the fattest, either instantly cut their throats or drew them by ropes to land and killed them. This appears to have been the last time there was any royal sporting on this Chase, and the Prince is said to have been 'very merry and well pleased.' So much for early 'sport.'

LARGE TREES IN THE PEAT.

There are numerous other items of interest to naturalists in this quaint old manuscript, but space only enables us to refer to some of the entries respecting the tree trunks found in the peat. 'This Great waste [Thorne] is of the same nature with that called Hatfield waste and Both of them, as also the Low Grounds and Commons in Hatfield Chase, is a sort of subterraneous fforest which is Dugg up Daily, as oak, Firr, &c. I have Known an Oak Tree taken up that afforded a Thousand pales five foot and a half Long and from six to seaven Inches Broad, for which I paid Ten shillings a Hundred Besides several Loads of firewood. . . . Firr Trees have been found underground above thirty Yards Long and Yet wanting many Yards at the small End, and have Sold for Masts for Ships from 4, 8, 10 to 15 pounds a piece, some have been found chop'd and squared, some bored through, some Burnd through on one Side, some half Riven with Great Wooden wedges in

* Trans. East Riding Antiq. Soc., Vol. 12, pp. 23-60.

them and Broken axe heads somewhat Like Sacrificeing axes in Shape. Under a tree near Hatfield was found 8 or 9 Roman coins. Mr. Edwd. Canby father to Late Mr. Thos. Canby of Thorne found an Oak Tree 40 Yards long, 4 Yards in Diameter at the Great End 3 Yards one foot in the midle Two Yards over at the small End, so that the Tree seems to have been as long again, for which he was offered twenty pounds.'

NEWCASTLE NATURALISTS.

Simultaneously have appeared two publications, printed by the same printers, and published by the same publishers, which will be a little puzzling to future bibliographers. One is entitled 'Natural History Transactions of Northumberland, Durham, and Newcastle-upon-Tyne,' Vol. 15, Part 1. The other is 'Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne' (New Series), Vol. 1, Part 2. The first of these is entirely devoted to Vol. 2, Part 1, of J. E. Robson's valuable 'Catalogue of the Lepidoptera of Northumberland, Durham, and Newcastle-upon-Tyne.' The second volume contains many interesting papers. The Rev. W. J. Wingate writes on 'A Ramble up Burnhope' (the Hancock Prize Essay for 1902); other items are 'On the Migration and Growth of Plaice,' by Alex. Meek; 'On Copepoda and other Crustacea taken off Northumberland and Durham in July 1904,' by Prof. G. S. Brady; 'Additions, etc., to the Coleoptera of Northumberland and Durham,' by R. S. Bagnall; 'On Some Lacustrine Deposits in the Drift near Ferryhill,' by J. Coggin Brown; 'Geological Notes for a visit to Rothley Crag,' by Prof. G. A. Lebour, etc. Such papers as 'Ancient Egypt, Part 2,' though they may be very interesting, hardly seem in their right place in publications of this kind.

BIRDS IN THE BRITISH MUSEUM.

A book which will be welcomed alike by naturalists, taxidermists, and museum curators has just been issued by the trustees of the British Museum.* This appears to be on a style not previously attempted, and from the reasonableness of the price and the wealth of beautiful illustrations will certainly have a large sale. As will be understood by the title, the volume is

* 'Guide to the Gallery of Birds in the Department of Zoology of the British Museum (Natural History).' London. 1905. 228 pp. and plates. Price 2s. 6d.

largely occupied by descriptions of the specimens in the Bird Gallery and of the Nesting series of British Birds. The well-known explanatory labels attached to the cases in the gallery



Little Bitterns, showing immature bird in protective attitude.

are reproduced in the present volume. Most interesting of all, however, are the two dozen carefully chosen plates. These are from photographs of the nesting groups and of a few specially

interesting birds. Every ornithologist who has admired the beautiful groups in the Gallery of Birds at South Kensington will be glad to have this permanent souvenir of his visit. It would be difficult to select the best plate, but we reproduce herewith, by the permission of the trustees, one of the series which may be taken as a representative of the whole. It shows an adult male and an immature Little Bittern, mounted to illustrate the marvellous instinct of self-preservation.

MAPS AND RECORDS.

COSMO JOHNS, F.G.S., M.I.MECH.E.,
Sheffield.

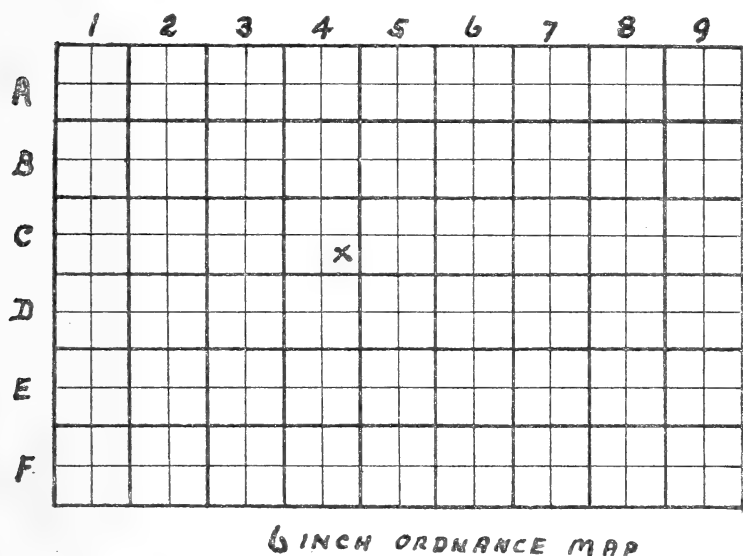
MUCH of the work now being done by local scientific societies necessitates the use of maps and, more than ever, does it imply the accurate noting of all the data obtained as a result of the observations made. It is the essence of many observations that the locality should be correctly stated, and much of the work done in the past lost nearly all of its value because the observers had not grasped the vital importance of exactly locating the geographical position of the spot where the observation was made. It must not be forgotten that scientific research is extending its boundaries, and daily brings into prominence the great fact that the main branches of natural science no longer occupy water-tight compartments, but overlap one another until now physicist and chemist, botanist and geologist, all meet on common ground and require each other's help in order to adequately deal with the larger problems that continually meet them. Hence the importance of accuracy and fulness in every note that may be made by the local naturalist. The data that seem to be almost valueless to-day may be to-morrow of the utmost value in throwing light on some obscure problem. But few of our local workers have had the advantage of that general training which teaches the observer to look out for and note every fact relating to the particular research work that may be engaging his attention. All the more necessary is it, therefore, that the amateur worker, after going as far as he can, should leave his investigations in such a form that another worker might extend and complete it. Of late much useful work has and is being done by local societies in botanical survey, recording of erratic boulders, etc., and no effort should be spared in ensuring that

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this and other local work should be as complete and accurate as possible.

It is with the view of not only indicating a method by which greater accuracy might be obtained, but also by which the local observer might be compelled to achieve a certain minimum of accuracy at least, that the writer now suggests a method of using maps and recording observations which seem to possess several advantages. It is simple, easy to apply, and what is, perhaps, of still more importance, it renders errors more difficult. It also makes easier the correlation of the results obtained by workers in the different branches of natural science.

The six-inch ordnance survey map has been taken as the basis of the method. This is the scale which will be found most useful, though the method suggested might, with modi-



fications, be used for other scale maps. This map, which measures eighteen inches in length and twelve inches in breadth, is divided by eight vertical lines and five horizontal lines into squares measuring two inches on the side. These in practice should be ruled thickly in red ink, and will each enclose an area measuring one-third of a mile each way. Thin red lines are ruled parallel to and between the thick lines, but much thinner. These inside squares will be one square inch, and enclose

a space measuring one-sixth of a mile each side. The inch being the unit selected makes the ruling simple, but, as will appear, there is a further advantage. It will be noticed that the numerals 1 to 9 are used, starting with the top left hand corner to designate the vertical columns formed by the thick lines and the letters A to F for those formed by the horizontal columns. Any particular large square must form the point of intersection of a vertical and horizontal column, and by quoting the letter and numeral corresponding to those columns the location of that large square is given in the easiest possible way and with the least chance of error. In scientific records, however, greater accuracy in denoting the locality is required, and for this the small inside squares are used. They are, each set of four, called *a*, *b*, *c*, *d*. Thus an observation in the small square marked x in the diagram would be recorded as C 4 *d*.

<i>a</i>	<i>b</i>
<i>c</i>	<i>d</i>

There would be thus ensured a respectable minimum of accuracy by the simple use of two letters and one numeral. The observer need not stop at this, but should, in his notes, give the bearings or other particulars from some fixed and noticeable point within the square he is using and the contour line. He should also clearly give the number of the map he was using when commencing his notices. Methods of dividing up maps similar to this have been proposed before, but the writer has never heard it suggested for natural history work. It is now being used for botanical survey purposes by the Botanical Section of the Sheffield Naturalists' Club and by the geologists in certain research work. Their experience is that the method is simple and conduces to greater accuracy in making notes.

It would not be difficult to suggest various directions in which this method would be useful. To those engaged in making a botanical survey its advantages are so evident that nothing more need be said except that the larger problems that will be suggested when that survey is completed will stand a better chance of being solved when workers in other branches of science can be supplied with notes giving localities in such a way that they can be easily transferred to geological or soil maps. Many an isolated worker would find the advantage of the method when discussing his problems with some other distant worker. It should also be particularly useful in geological work. The mapping of erratics in a district would

be simplified, every square could be adequately dealt with.* If every fossil collector could be induced to record the locality of each of his specimens in this way a great stride would be made.† In working out the life-zones of many formations the horizontal distribution of certain fossils is as important as their vertical distribution. The life-zones in the Carboniferous Limestone series would not have still been undetermined had collectors in the past but grasped this important fact. It might happen that careful recording of locality by conchologists might throw some light on the causes that determine the distribution of the various species of the land mollusca. Even the entomologist might use the method and thus help to round off the work of the various branches of natural history. The solid rocks, the protecting soil, and the many forms of plant-life, with the innumerable annuals, all form parts of the great scheme of life. Winter's snow and the summer sun affect them. Together they seek to establish an equilibrium, and in doing so, many are the problems that suggest themselves to the lover of Nature. Accurate observation carried on patiently and diligently is the only method by which the data for solving these problems can be obtained. This is just the work that local societies can do, and it is in the hope that the value of these observations might be increased that this suggestion of a systematic method for indicating the locality is made. To the objection that this may lead to the extermination of rare plants the obvious reply may be made that their locality should never be stated. The fortunate botanist who finds them can easily notify the fact of their occurrence without giving such particulars as would afford an excuse for the misapplied energy of unscrupulous collectors.

SHELLS.

***Paludestrina jenkinsi* at New Holland.**—When at New Holland in July I collected *Paludestrina jenkinsi*.—W. HARRISON HUTTON, Leeds.

* This method was adopted some years ago by the East Riding Erratic Blocks Committee, with very successful results.—EDs.

† A somewhat similar plan has been carried out for many years by Mr. J. R. Mortimer in connection with his well-known collection of East Yorkshire Chalk fossils. Mr. Mortimer's plan, however, is to give a separate number to each field on the map. The specimens are numbered: S. (Sheet) x.—F. (Field) x. Thus: S. 46, F. 47=Sheet 46, Field 47, and in this way the locality for the quarry or section from which any fossil has been obtained can be seen at a glance.—EDs.

NOTES ON THE BRITISH REMAINS FOUND NEAR THE CAWTHORN CAMPS, YORKSHIRE.

J. R. MORTIMER,

Driffild.

SEVERAL of the barrows near the camps were opened by the late Thos. Kendall, of Pickering, and the late Jas. Ruddock between 1849 and 1853. A description of the latter gentleman's excavations is given in 'Ten Years' Diggings in Celtic and Saxon Grave Hills,' by Thos. Bateman, p. 206.

On the 26th of November 1849 a large barrow was opened near Cawthorn Camps, 65 yards in circumference and 7 feet in elevation, composed of sand, burnt clay, and limestone rubble. At the centre was a grave 15 feet long, 7 feet wide, and 11 feet deep. At the bottom were two skeletons lying at length, with their heads pointing respectively east and west. At the right side of one lay a spear-head of flint $2\frac{1}{2}$ inches long, and at the same side of the other was a bronze dagger, $4\frac{1}{2}$ inches long.

Another very interesting barrow, situated near, was next opened. In the centre was part of a complete circle, 7 yards in diameter, of flat stones standing on edge, about 2 feet above the natural level, and enclosing a grave 5 feet by 4 feet and 3 feet deep, containing a contracted skeleton with head to the south. Close to the skull was a small vase.

Other mounds in this immediate neighbourhood were opened by Mr. Ruddock, with varying results.

The notes of the late Mr. Kendall's excavations have not to my knowledge been put in print. This is much to be regretted. Some little, however, is known of Mr. Kendall's discoveries.

Dr. J. B. Davis, in referring to the colour of the hair of the Ancient Britons, writes in 'Crania Britannica' as follows:— 'In a British barrow of the extensive series of the eastern moors of Yorkshire, which present such proof of a Brigantian population, opened by Mr. Kendall a few years ago [1849 to 1853], human hair was discovered which had been formed into a personal ornament. The excavation first exposed a British urn in an inverted position. When this was lifted up, it was found to cover a small vase placed upright, round the foot of which lay, upon the bottom of the cist, a beautiful chaplet of light auburn hair. This pledge of affection was quite perfect when first exposed, and had been carefully braided in four plaits, fragments of which are still preserved.

In July 1896 I visited Mr. Thomas Mitchelson's Museum at Pickering, which now contains the late Mr. Kendall's collection of British relics, but no portion of this chaplet now remains. However, I got a very vivid confirmation of this find from Mr. Dowson, who accompanied me to the museum, and who assisted the late Mr. Kendall in all his barrow excavations, and was present when the chaplet was found. Mr. Dowson pointed out to me the two vases which accompanied the chaplet, and told me that a bone pin and a bone hook were also found with the plaited hair.

Kendall, about the year 1849, also found the remains of a British chariot in a barrow close to the Cawthorn Camps, the wheels and other parts of which are now in the possession of Thos. Mitchelson, Esq., of Pickering.

I well remember Mr. Kendall naming this find to me many years ago, and he much regretted that he was not able to sketch, so as to give the shape and position of the chariot. He described the mound as being mainly composed of light-coloured sand, and said that the position and, in the main, the form of the chariot was clearly visible. The tyres of the wheels were well preserved, whilst the pole (which had measured about 7 feet) and other woodwork was shown by dark lines of decayed wood, clearly defined in the clean, light-coloured sand. It is much to be regretted that so good an opportunity of obtaining a restoration of a British chariot was lost.

On 2nd April 1894 I interviewed old Mr. Dowson. He fully confirmed what Mr. Kendall had told me about the chariot, and added that the mound is situated very near the south-eastern corner of the most easterly of the three camps, and that at the time its height would be a little over 3 feet. One of the chariot wheels was pressed down nearly flat, and the decayed wood of the spokes, which numbered only four, was shown very clearly. The other wheel stood upright and nearly reached to the top of the barrow. Mr. Dowson said the pole reached eastwards about 7 feet from the body of the chariot, and at the terminal end were decayed hooks and rings of iron and brass.

In reply to further inquiry, he said there were no human or animal bones or any other article with the chariot, which seemed to have been placed on the old surface line under the barrow. Unless the interment was a cremated one, simply placed in a heap at the base of the barrow and not observed by Mr. Kendall, I am inclined to think that the owner of the chariot may have been buried in a grave somewhere under the mound, and that, after his body was covered up, the chariot was placed upon or near the grave, and then covered with the mound.

YORKSHIRE NATURALISTS AT POCKLINGTON.

POCKLINGTON was the place selected for the 189th meeting of the Yorkshire Naturalists' Union on August Bank Holiday week-end. From this centre Allerthorpe Common, Barmby-on-the-Moor, Nunburnholme, Warter, Millington, and the surrounding dales were visited, whilst the evenings and early mornings were profitably spent in examining the many interesting geological sections, woods, and lanes in the immediate vicinity of the quaint market town in which the members made their headquarters.

On Saturday morning a start was made at Nunburnholme, the home of the late F. O. Morris, the 'Selborne of the North,' as some have styled him. The party called at the Rectory, where the Rev. M. C. F. Morris showed the members the principal features of interest in his church. A hard bed of chalk appears to have been quarried for the purpose of erecting the edifice, and an arch of this material—at least eight centuries old—spoke well for the durability of this stone. Of particular interest was a portion of a magnificent pre-Norman cross, upon which various symbolical figures were carved. These caused much speculation as to their significance. The road was followed to the fish-pond at Warter, resplendent with the yellow Water-lily. En route the geologists examined a section in the Lower Lias, from which several characteristic fossils were secured. In the brick-yard at Warter the well-known section showing the red chalk resting directly upon the Lower Lias was seen, and by a small excavation which was made the actual junction of the two beds was exposed. In this pit is the greatest 'unconformity' known in East Yorkshire.

On the following day the botanists visited Allerthorpe Common. Several treasures were secured, the examination of which occupied the members till a late hour in the evening. The geologists went towards Yapham, and noted the exposures in the superficial deposits in the gravel-pits which abound in the district. In a sand-pit near Barmby-on-the-Moor the upper portion of a fine Roman earthenware vessel was found. On the edge of the Common were numerous circular pits in a field which have been described by some as British pit dwellings. Inquiries, however, proved that they were formerly used for preparing flax. In a similar way, probably, other so-called British pit-dwellings can be explained. Other items of antiquarian interest were noted.

The members continued their investigations on Bank Holiday, the route taken being from Pocklington, through Givendale, over the Wolds to Millington, and back by the picturesque Millington springs and valley. The famous springs were examined by the party, and in the dale itself attention was drawn to those remarkable earthworks which are of a very early date, and were described by Mr. Mortimer, of Driffild, as habitation terraces. The botanists were successful in obtaining 212 species of flowering plants, together with a large number of mosses, fungi, and lower forms of plant life.

After dinner at Pocklington the meeting was held, Mr. G. T. Porritt, F.L.S., Huddersfield, presiding. At this the various reports of sections were presented.

For the conchologists the Rev. F. H. Woods reports :—The shells found were *Helix virgata* with variety *submaritima*, both frequent on dry ground in pastures and the roadsides; *H. nemoralis*, on roadsides; *H. cantiana*, on roadsides up the long hill towards Warter, mostly of a reddish type; *H. arbustorum* with var. *pallida*, in the same locality. A very dark variety was also taken in the wood on Major Duncombe's estate. In these two cases one fancies that the different locality may have indirectly influenced the colour, the dark specimens being found among damp, mossy stones, the light coloured in dry places in the open. *H. rotundata*, among mossy stumps in the same wood; *H. ericetorum*, one specimen was found; *H. hispida*, smooth variety; *Ancylus fluviatilis*, abundant on the stones in the brook in the valley above Millington, but only young specimens. On Saturday we found *Anodonta cygnea* and *Limnæa auricularia*. I also found several young specimens of *Ancylus fluviatilis* in the brook below the lake. This also yielded a fine example of *Anodonta cygnea* var. *incrassata* Sheppard.

For the Mycological Section, the Hon. Secretary (Mr. C. Crossland, F.L.S.) reports :—The results achieved by the Fungus Section came quite up to expectation. The long spell of hot, dry weather had warned us not to be over sanguine in regard to quantity. The few toadstools met with are of common occurrence, with the exception of *Mycena pullata* and *Hebeloma subsaponaceum* Karst. The latter does not appear to have been previously recorded for Britain; *H. sinapizans* and *H. crustuliniforme* are its two nearest allies; it differs from the former in the non-emarginate gills, and in smell; from the latter in the dry, non-crenulate, adnate gills, and the strong, soap-like smell. Next in point of numbers come the Uredinaceæ.

The distribution of most of those met with is pretty general; two—*Puccinia calthæ* and *Triphragmium ulmaricæ*—are less common; the latter was found in quantity on Meadow-sweet in one of the surface drains on Allerthorpe Common. The leaves of a wild Rose bush by the wayside between Pocklington and Millington were covered with the pustules of *Phragmidium subcorticatum*. In a Pine-Poplar wood near the same place white moulds appeared to be prevalent on several plants.

An Oat field near Barmby-on-the-Moor was in a sorry plight. The oat plants were thinly strewn and short in the straw. In some parts of the field the 'crop' consisted almost solely of badly-diseased Knot-grass. This is a very troublesome weed, bad enough when healthy, much worse when diseased; it was almost white with the parasitic mould *Erysiphe communis*, in addition to being attacked with *Uromyces polygoni*. The few oats there were appeared to be healthy in the grain, though the surroundings were frightful for a grain-growing field. Whether these conditions were owing to sheer neglect, miserably poor farming, or natural poverty of the land—a loose sandy soil—I am not prepared to say.

The full list of species found is given below, the only value of which is to help in working out a more complete distribution.

P. = Pocklington; A.C. = Allerthorpe Common; M. = Millington; B. = Barmby-on-the-Moor.

GASTROMYCETES.

Scleroderma verrucosum. P.

HYMENOMYCETES.

Amanita rubescens. A.C.

Collybia dryophilus. A.C.

Mycena pullata. A.C.

Entoloma jubatum. A.C.

Inocybe rimosa. M.

Hebeloma subsaponaceum.

In Beech plantation. A.C.

Galera tenera. A.C.

Galera hypnorum. A.C.

Agaricus campestris. P., B., M.

Stropharia stercoraria.

= *stercoraria*. P.

Panæolus retirugis. A.C.

Coprinus niveus. A.C.

Coprinus plicatilis. P., A.C.

Coprinus micaceus. A.C.

Paxillus involutus. A.C.

Marasmius oreades. P., B., A.C.

Marasmius peronatus. A.C.

POLYPORACEÆ.

Boletus flavus. A.C.

Polyporus squamosus. P.

Polyporus elegans. M.

Polystictus versicolor. P.

HYDNACEÆ.

Hydnum Stevensoni. M.

UREDINACEÆ.

Melampsora pinitorqua Rostrup
= *M. tremula*.

On *Populus tremula*. A.C.

Melampsora epitea.

On *Salix viminalis*. A.C.

Coelosporium senecionis.

On *Senecio Jacobæa*. A.C.

Uromyces polygoni.

On *Polygonum aviculare*. B.

Uromyces geranii.

On *Geranium pratense*. P.

Puccinia calthæ.

On *Caltha palustris*. M.

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Puccinia pulverulenta.
On *Epilobium hirsutum*. A.C.
Puccinia rubigo-vera.
On *Holcus mollis*. A.C.
Puccinia poarum.
Æcid. on *Tussilago farfara*.
M.

Puccinia suaveolens.
On *Carduus arvensis*. A.C.
Puccinia hieracii. A.C.
Phragmidium subcorticatum.
On wild Rose. M.
Triphragmium ulmarie.
On *Spiræa ulmaria*. A.C.

USTILAGINEÆ.

Ustilaga avenæ.
On *Arrhenatherum avenaceum*. P.

PYRENOMYCETES.

Xylaria hypoxylon. M.
Rhytisma acerinum.
On Sycamore leaves M.
Sphaerella taxi.
On Yew leaves. M.

Sphærotheca castagnei.
On *Spiræa ulmaria*. M.
Erysiphe communis.
On *Polygonum aviculare*,
Ranunculus repens, *Hera-
cleum sphondylium*, and
Circæa Lutetiana. M.
Erysiphe cichoracearum.
On *Arctium Lappa*. M.

DISCOMYCETES.

Humaria melaloma. A.C.
Chlorosplenium æruginosum. M.
Mollisia lignicola. P.
Ascobolus furfuraceus. P.

PHYCOMYCETES.

Pilobolus crystallinus. M.
Mucor mucedo.
Also var. *canina*. P.

HYPHOMYCETES.

Trichoderma lignorum. P.
Botrytis vulgaris. P.
Sepedonium chrysospermum. A.C.
Cladosporium herbarum. P.

The majority of the members present showed a kindly interest in mycology by carefully collecting all the specimens they met with.

On the Heather on Allerthorpe Common were numbers of a large spider, respecting which the Rev. O. Pickard-Cambridge writes:—Its name is *Epeira quadrata* Clk., a young and very small specimen. When full grown it is one of our largest, handsomest spiders. It is *local* but generally abundant where found.

For the bryologists Mr. J. J. Marshall writes:—Owing to a series of adverse circumstances the meeting was not a success from a bryological point of view. The dry season, the arid character of the country traversed, and the disastrous fire on Allerthorpe Common combined to reduce the specimens gathered to very small proportions. Nineteen mosses and five hepatics were observed. Four mosses are worth recording:—*Dicranum spurium*, from the common, an old station; *Hypnum chrysophyllum*, *Cylindrothecium concinnum*, and *Barbula Hornschuchiana* were found on a bare patch of ground on the chalk near Millington.

GEOLOGY.—On the Superficial Deposits Mr. John W. Stather, F.G.S., writes :—There is a large spread of Chalk Gravel in the neighbourhood of Pocklington. It was examined in several shallow pits near the town and at the quarry of the Pocklington Brick and Tile Works, where it was seen in section from 2 to 3 feet thick, resting directly on the Keuper Marl (see photo on p. 272). Nearer the Wolds it is much thicker, and at Yapham, two miles north of Pocklington, it is said to be upwards of 30 feet thick. It is composed almost entirely of slightly water-worn fragments of chalk and flint, that is to say, the angles of the chalk pebbles are slightly rounded, while the flint remains quite sharp and angular. Diligent search was made in the gravel for pebbles foreign to the district, but nothing was noted beyond some fragment of Trias, Lias, and Oolite (all local), and a few quartzite pebbles. It is interesting to observe that the thickness of these beds of gravel varies considerably in short distances, and that consequently the old surface of the Trias must have been much more uneven than the present surface of the country.

The Wold hills near Pocklington are apparently free from superficial deposits, but some scattered quartzite pebbles were noted on the high ground near Millington and Warter (see 'Naturalist,' 1904, pp. 9-11, 54-56). On the other hand, in the bottoms of all the valleys in the Chalk, there is a deposit of chalk fragments, evidently formed by the disintegration of the beds in situ, and not brought from a distance.

From the hills near Kildwick Percy extensive views of the Plain of York were obtained from time to time. Westwards the well-known morainic hills in the neighbourhood of York could be distinguished taking the form of two great ridges, crossing the plain at York and Eserick. These ridges rise to a height of from 30 to 60 feet above the flat and contain boulders of Shap granite and other Lake District and Teesdale rocks.

Looking southwards, the flat low land of the valley, consisting chiefly of warps, lacustrine clay, and sand, could be traced as far as the Humber, the isolated hill of Holme-on-Spalding-Moor being a conspicuous object in the middle distance. The disposition of the superficial deposits on and around this little hill is of great interest. The hill (Keuper Marl) rises to 150 feet above the level of the sea, and is capped with gravel mostly composed of western rocks, while the gravels on its flanks, which also spread around its base are mainly fragments of local rocks.

Mention should also be made of the gravels in the neighbourhood of Brough and Elloughton, the remarkable deposit of big angular boulders of local rocks at Sancton, and the fossiliferous marls at Bielsbeck.

From the foregoing facts it is manifest that the superficial deposits of this part of the Plain of York offer a very interesting field to geologists investigating the glacial and post-glacial problems of our county.

As regards the origin of the chalky gravel more particularly under the observation of the geologists at Pocklington, the opinion was expressed that the forces now in operation were insufficient to account for the spread of this material over such a wide area, but that probably the gravel was formed originally in the bottoms of the adjacent big dales of Millington, Deep Dale, and Warter Dale, to be subsequently swept out into the plain by water rushing down the valleys from the higher levels.

For the 'Solid' Geology Mr. Cosmo Johns, F.G.S., writes :— Having regard to the many points of geological interest in a district like that of Pocklington it was to be regretted that time did not permit of a more extended investigation. Under the circumstances attention, so far as the solid rocks were concerned, was concentrated on the remarkable unconformity between the Chalk and Lias, and also in endeavouring to trace the supposed Rhætic beds that have been mapped there. Incidentally the party came across a most interesting example of a fault in the Keuper Marls in the White Brick and Tile Works. The varied colours of the marls contrasted well and made the fault appear very striking. To return, however, to the evidence of the Market Weighton unconformity. The most interesting section was undoubtedly that seen on Saturday. In the beck below Warter Priory the *Ammonites planorbis* zone of the Lias was seen and *Pleuromya crowcombeia* obtained. The *Ammonites angulatus* zone was not visible, but in the upper part of the park near the brickyard the *A. bucklandi* zone appeared, and just above could be seen the Red Chalk. This was satisfactory in that an idea could be formed as to the extent of the pre-Cretaceous denudation. Coming from Warter it was interesting to note when crossing the Kildwick Percy hill that the Red Chalk appeared on both sides, with the Grey Chalk and Chalk with flints above. On Monday a careful search was made up the beck at Swinebridge for the supposed Rhætic beds mapped there. A fair section of the Keuper Marls was noted, but nothing that could with certainty be referred to the Rhætics

was found. The failure to find them proved nothing, for the time at the disposal of the party was limited, and they could easily have been missed in the bed of the beck. But when we review the evidence on which they were mapped it must be said that it would not be thought convincing to-day, and it should be noted that the officers of the Geological Survey, in their recent revision of the South Wales Coalfield, have removed the

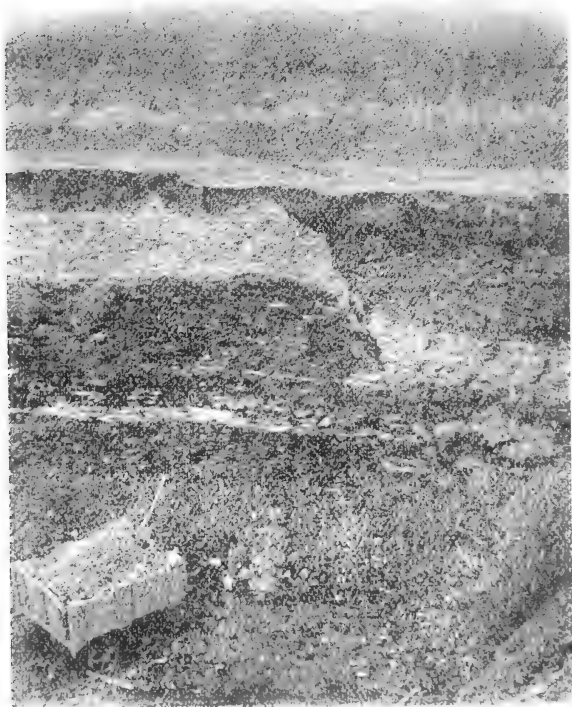


Photo by]

[H. E. Wroot.

Fault in the Keuper Marls near Pocklington.

'tea green marls' of classic fame from the Rhætics and include them with the Upper Keuper, taking the strata in which *Avicula contorta* makes its appearance as the base of the Rhætics. While not going so far as to say that there are no Rhætic beds at Pocklington it would certainly appear that the sections depended upon for the mapping have a decided Upper Keuper or Lower Lias aspect, while the absence, so far as is known, of

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the *A. contorta* zone in the district is a strong argument in favour of the negative side of the question.

After the unsuccessful quest of the Rhætics, attention was turned to the old Liassic floor on which the Red Chalk rests. A very fair exposure of the Chalk with pink bands was seen at Great Givendale, and when White Keld Springs were reached, a very interesting section of Red Chalk with ferruginous sand resting on some doubtful shales. These were carefully examined for organic remains, but proved barren, though their aspect was that of the Lias. At Millington Springs we had the Red Chalk with its characteristic Belemnite again and below it a blue clay appeared. This could be referred with some confidence to the Lower Lias, though no direct evidence was obtained. A little lower down the dale the top of the Red Chalk with the Grey above was seen, and from the two exposures it would seem that the Red Chalk could not have exceeded 5 feet in thickness. These sections, together with that of Saturday, complete the evidence obtained for the striking unconformity already referred to. Owing to the absence of fossils it was not possible to determine the particular zones of the Lias seen on Monday, and, consequently it was not possible to throw much new light on the structure of the Market Weighton anticline. It might be pointed out, however, that the statement in the circular that 'the disturbance was initiated in the interval between the deposition of the Middle Coal Measures and that of the Permian' does not go far enough, and hardly does justice to this striking example of the effect of persistent earth movements. The paucity of sections renders a discussion rather difficult, but sufficient is known to make it clear now, as a result of recent deep borings, that a differential earth movement in a vertical plane was in operation *during* the deposition of the Middle Coal Measures, and continued intermittently up to the deposition of the Chalk. How much further back than Middle Coal Measure time the initiation of the axis should be placed is impossible to say in the present state of knowledge. That the ridges and hollows of the old Silurian floor played an important part in shaping the present boundaries of the coal basins is becoming, however, more and more evident as their structure is being studied.

Turtle Dove Nesting near Scarborough.—A pair of these beautiful birds nested at Wykeham in June.—R. FORTUNE, Harrogate.

THE CHEMISTRY OF SOME COMMON PLANTS.

P. O. KEEGAN, LL.D.,

Patterdale, Westmorland.

Lichen (*Parmelia parietina*).—This flatish and circular organism is affixed to farmsteads or stables, or on pales, posterns, rocks, and cold stones. Many an outlying barn or hay-shed in the heart of the valley away out in the free, pure, unpolluted air is brightened by a conspicuous dressing of the yellow thallus and the deep orange apothecia. Physiologically it is a symbiotic association of a green alga and a colourless fungus—living by a kind of mild parasitism—the fungus borrowing from the alga its carbohydrates (or actually feeding on and digesting it, according to some authors), while the alga in return borrows its water, proteids, and salts from the fungus. According to an old chemical analysis this Lichen contains stearin, chlorophyll, carotin, lichenin, sugar, gum, mucilage, traces of volatile oil, resin, wax, and chrysophanic acid. Later researches have shown that the yellow and orange colouring matter is very superficially distributed, and is not chrysophanic acid or vulpinic acid, but a simpler derivative of anthraquinone called chrysophysicin. Still later Hesse found and called it physicon $C^{16}H^{12}O^5$, owing to its quinonic character; it is brick-red and not yellow, and forms a bluish-violet and purple compound with potass; the plant also contains two colourless bodies, viz., physcianin $C^{10}H^{12}O^4$ coloured bluish-violet by iron salt, and physicol $C^7H^8O^3$ coloured greenish-black by the same reagent. According to Thompson there is 6·8 per cent. of ash having 0·75 per cent. sodium salts, 68 silica, 8·75 carbonate of lime, and 22 to 34 oxide of iron with phosphates of iron and lime. The plant contains a bitter principle which renders it febrifuge; the hymenium (paraphyses and thecæ) and the tissue beneath it are penetrated by a mucilaginous substance (probably a hydro-cellulose) which is blued by iodine, while the walls of the hyphal filaments are extremely thick and enclose fine threadlets of protoplasm. The fact that no lichen is poisonous, while several fungi are deadly so, points conclusively to a very distinctive difference between these two tribes of plants. Everything tends to prove that the lichen is a higher organism physiologically speaking. Its colouring matters are true products of healthy deassimilation, whereas those of fungi are mere decomposition or degradation waste products of the albumenoids akin to alkaloids. The lichenin of lichens is undoubtedly also a natural

Naturalist,

product, whereas the lichen-starch of certain algæ may be regarded as a degradation product of cellulose. It is not apparently that there is a drain on the fungal element by the alga in respect to proteid matter that occasions these distinctive differences, but rather that the true unassociated fungus absorbing its nitrogen mainly from organised bodies in a state of decomposition this constituent may lend itself readily to that particular form of degradation in the body of the plant which yields alkaloids and other poisonous principles.

Common Polypody (*Polypodium vulgare*).—This may be regarded as an evergreen among ferns. Unlike most of its tribe it shuns the steamy warmth and moist sensations of the woodland dell, and breaks out boldly in the open, dry, sunny places however artificial, such as stony unmortared walls, roofs, towers, steeples, or old trees. It nourishes itself independently of any symbiotic fungi (mycorrhiza) and hence there is great development of the root system, a copious water-current, a taking up of nitrogen in the form of nitrate, and a free cultivation in soils poor in mineral salts. The rhizome is charged with starch, and certain of its cells contain a finely granular protoplasm and numerous droplets of fat-oil, the brown cells are formed of vasculose and are not lignified; there is a large quantity of glycyrrhizin (same as in liquorice) which is a nitrogenous glucoside of a sweet taste and yellow colour, and forms a jelly with water, also an iron-greening tannin, and some saponin and resin. The fronds contain about 3 per cent. wax with some fat-oil, but very little carotin or resin, also 4.4 per cent. tannin, free phloroglucin, mucilage, and oxalate of calcium (in the nerves and petiole only), and 4.5 per cent. of ash which in November had 43.5 per cent. soluble salts, 5.9 silica, 17.7 lime, 6.8 magnesia, 9 P_2O_5 , and 7.6 chlorine. In the old withered frond of late April the silica rises only to 8.3 per cent., in marked contrast to that of bracken which reaches in October the enormous figure 53. We see, therefore, how sturdily this cold-enduring plant maintains an active vitality all through the winter rigour.

Yellow Loosestrife (*Lysimachia vulgaris*).—This gay and steadfast plant affects the water-side; it springs up year by year with irresistible persistency on certain well-defined spots—the stony marge of lake and beck, and assumes a certain air of brilliant gaiety incident to a rather showy panicle of golden flowers. The root possesses secretion-glands with a red-brown content, its cortex is rich in starch and has abundant tannin.

The leaves at end of August contain about 2 per cent. wax with considerable carotin and a resinous substance yielding fine red solutions with mineral acids; also an iron-greening, phlobaphenic, catechol tannin along with some tannoid, but no gallic acid or free phloroglucin; there is very much mucilage but very little sugar or starch; the ash of the leaf amounts to 5.7 per cent. in dry which had 38.8 per cent. soluble salts, 24.8 lime, 5 magnesia, 5.5 P_2O_5 , 10.5 SO_3 , and 6.4 chlorine. The flowers are tinged by carotin, and have also much wax and pectin with only a little starch, tannoid, or proteid. I am not satisfied as to the existence of a saponin in this plant.

Purple Loosestrife (*Lythrum salicaria*).—Botanists may be interested to learn that I have found this plant in marshy places quite unbeknown to local grubbers and separated by several miles from habitats well-known to these gentry. Marshy meadows and ditches away from the haunts of men are decked quite superbly and unexpectedly with the pure purplish spikes ranged compactly round the graceful high-pitched stem. Systematically it is regarded as little more than a saxifrage with united styles and scattered stamens, but the chemistry hardly warrants the hypothesis of a close alliance with the Rosaceæ or Leguminosæ. For instance, it contains gallotannin similar to that in the willow-herbs and enchanter's nightshade; there is much mucilage and sugar, and the above-ground parts (minus the flowers) yield 7.3 per cent. of ash in dry having 27 per cent. soluble salts, 31.3 lime, 4 P_2O_5 , 9.51 SO_3 , 5.6 Cl, 4.2 SiO_2 , and very little manganese. The pigment of the flowers is nearly pure, approaching that of the Sweet Pea and Violet; but not so well developed as that of the Meadow Crane's Bill.

Water Lily (*Nymphæa alba*).—This is the 'empress of the lake,' and the 'delight of the waters.' Its head 'floats on the tossing waves and courts the wind.' Unfortunately, owing to lack of material, I am unable to present my own analysis of this plant, and must therefore merely recite the researches of Grüning and Schulz-Fleeth, published some twenty years ago. The thick fleshy rhizome prefers a peaty bottom, and contains about 4 per cent. fat and resin, 10 tannin and phlobaphene, 6.25 glucose, 20 starch, 4 albumen, 23.6 lignin and cellulose, and 5.5 ash. The thick stems have a bitter astringent taste, and along with the old leaves yield 13 per cent. of ash in dry, having 50 per cent. soluble salts, 18.9 lime, 0.5 silica, 2.58 P_2O_5 , 1.2 SO_3 , and 17.9 chlorine. There is no alkaloid in the

blossoms or seeds, but there seems to be a narcotic principle in the rhizome which is non-poisonous. According to Grüning the tannin is non-glucosidal and yields when warmed with a dilute acid gallic and ellagic acids, together with a phlobaphene; but I think it is very doubtful if gallotannin is really present, or any other substance yielding the acids mentioned. As far as I can judge the chemical analysis recalls that of the Ranunculaceæ, although according to some recent authorities the Nymphæaceæ should be placed in the Monocotyledons.

Marsh Marigold (*Caltha palustris*).—Just at the beginning of spring, on casting our eye over moorish tracts or along the edges of long-neglected grassy fields, we may exclaim with the poet: 'In yonder marshes burns the fiery-flaming Marigold.' Whether it be the new-fledged fund of vitality, or the specially resuscitating stimuli incident to a perennial bursting into existence at the earliest promptings of the genital season, it is certain that this plant produces an uncommonly large amount of carotin and chlorophyll. The root encloses much starch and some iron-greening tannin. The dried leaves contain about 1·6 per cent. carotin and wax, with traces of fatty matter, also much tannoid with reactions like quercitrin, a large quantity of pectosic mucilage, but not much proteid or starch, and 9·7 per cent. of ash, which had 43·5 per cent. soluble salts, 19·1 lime, 4 magnesia, 5·3 SO^3 , 5·5 P^2O^5 , and 8·7 chlorine. The flowers yield 2·6 per cent. carotin and wax, much tannoid, and very much mucilage, but little sugar and no starch (distinguished from common Buttercup and lesser Celandine) and (air-dried) 6·4 per cent. ash which contains 55·2 per cent. soluble salts, 9·2 lime, 6·2 magnesia, 10·9 P^2O^5 , 7·1 SO^3 , and 5·5 chlorine. It would seem that in this plant the starch is chiefly concentrated in the root, and although the stem and leaves abound in mucilage the quantity of oxalate of calcium is inconsiderable in all parts. The acrid taste of the plant is not due to anemonin, as in so many allied Ranunculaceæ; it is apparently that of a bitter principle derived from a decomposed saccharine matter.

LIVERWORTS.

At the meeting of the Lincolnshire Naturalists' Union at Scotton, on 28th July, the following Liverworts were taken:—*Pellia epiphylla*, *P. calycina*, *Marchantia polymorpha*, *Riccia fluitans*, *Fossombronia cæspiliformis*, *Nardia scalaris*, *Kantia trichomanis*, *Cephalozia bicuspidata*, *Lophocolea bidentata*, and *Scapania irrigua*.—J. REEVES.

MOSES AND HEPATICS OF ASKRIGG AND DISTRICT.

WM. INGHAM, B.A.,

York.

THIS district is particularly rich in these plants. Some years ago Mr. R. Barnes, of Harrogate, carefully worked this part of the botanical Vice-county 65 and discovered a good number of our rarest British mosses. On the occasion of the recent visit of the Yorkshire Naturalists' Union it was interesting to confirm some of Mr. Barnes' discoveries and add other rare and interesting mosses and hepatics.

It will be convenient to arrange the plants according to the routes traversed and to indicate Mr. Barnes' original discoveries by the letters R. B.

ASKRIGG AND WHITFIELD GILL.

The rarest mosses are :—

- BARBULA CURVIROSTRIS var. COMMUTATA. Whitfield Force. (R. B.)
- SELIGERA TRISTICHA. Whitfield Gill. (R.B.), this very rare and very minute moss being found at this visit *beyond* Whitfield Force.
- TRICHOSTOMUM NITIDUM. Askrigg. (R. B.)
- BRYUM CONCINNATUM. Whitfield Gill. (R. B.)
- ANOMODON LONGIFOLIUS. Askrigg. (R. B.)
- AMBLYSTEGIUM SPRUCEI. Mill Gill. (R. B.)
- AMBLYSTEGIUM CONFEROIDES. Askrigg. (R. B.)
- ANOMODON VITICULOSUS. Fruiting abundantly by the side of Mill Gill.
- TRICHOSTOMUM CRISPULUM var. ELATUM. Whitfield Gill.
- EURHYNCHIUM CRASSINERVIVM var. TURGESSENS. Whitfield Gill.
- HYPNUM OCHRACEUM var. FLACCIDUM. In fruit, Whitfield Gill.
- EURHYNCHIUM TEESDALEI c.fr. Whitfield Gill.
- HYPNUM FALCATUM var. GRACILESCENS. Whitfield Gill.

The following is a list of the rarer or more interesting mosses in addition to the above :—

- SELIGERIA DONIANA C.M.
- SELIGERIA PUSILLA B.&S.
- BARBULA RECURVIFOLIA Schimp. (R. B.)
- BARBULA SPADICEA Mitt.
- BARBULA RIGIDULA Mitt.
- BARBULA CYLINDRICA Schimp. c.fr.
- BARBULA UNGUICULATA var. OBTUSIFOLIA (Schultz.). On limestone rocks at Nappa Hall.
- TRICHOSTOMUM CRISPULUM Bruch., type.
- ORTHOTRICHUM LYELLI H. et T. In fruit, Askrigg. (R. B.)
- BARTRAMIA ITHYPHYLLA Brid.
- WEBERA CRUDA Schwgr. c.fr.
- WEISIA RUPESTRIS C.M. In varied forms, ranging from dwarf to two inches high.
- MNIUM ROSTRATUM Schrad. and M. PUNCTATUM L., both crowded with fruit at Whitfield Force.

ORTHOTHECIUM INTRICATUM B.&S.
 EURHYNCHIUM SWARTZII Hobk. A large glossy form.
 EURHYNCHIUM PUMILUM Schp.
 EURHYNCHIUM TENELLUM Milde.
 PLAGIOTHECIUM DEPRESSUM Dixon. (R. B.)
 PLAGIOTHECIUM DENTICULATUM B.&S. var. MAJUS Boul.
 HYPNUM STELLATUM Schreb. var. PROTENSUM B.&S.
 HYPNUM INCURVATUM Schrad. (R. B.)
 HYLOCOMIUM BREVIROSTRE B.&S. (R. B.).

The hepatics of Whitfield Gill are as follows:—

METZGERIA PUBESCENS (Schrank) Raddi.
 PREISSIA COMMUTATA Nees.
 CHILOSCYPHUS POLYANTHOS (L.) Corda.
 APLOZIA RIPARIA (Tayl.) Dum.
 APLOZIA CORDIFOLIA (Hook.) Dum.
 PLAGIOCHILA ASPLENIOIDES var. DILLENII (Tayl.).
 SCAPANIA UNDULATA (L.) Dum. A vivid green form.
 CEPHALOZIA BICUSPIDATA (L.) Dum. A very small form with closely imbricated leaves.
 RADULA COMPLANATA (L.) Dum. A beautiful form covered with fruit.
 MADOTHECA PLATYPHYLLA (L.) Dum.
 COLOLEJEUNEA CALCAREA (Lib.) Schffn. (R. B.)
 FRULLANIA TAMARISCI (L.) Dum. A very small form.
 FRULLANIA DILATATA (L.) Dum.

ASKRIGG COMMON.

On this common, at a height of about 1,700 feet, is a very interesting moss, growing cushion-like in a large mass on a stone by the side of the path. I make it *Ditrichum flexicaule* Hpe. var. *densum* Braithw. var. *brevifolium* Kindb. In addition to its short leaves it has very small, dot-like and crowded cells, distinct from type. It is described by Macoun in 'Canadian Mosses' as a sub-species, with the remark, 'perhaps a distinct and proper species; the tufts are quite barren.' So distinct was the moss in situ that I gathered it for a *Campylopus*, although I have seen *Ditrichum flexicaule* in many places in Yorkshire and Durham. Unfortunately the plant is quite barren, as the Canadian one mentioned above. I intend to get further opinion on this plant.

Growing with the *Ditrichum* was the hepatic *Scapania aspera* Bernet, and on the moor close by are *Hypnum intermedium* Ldb. and *H. fluitans* var. *Jeanbernati* Ren. forma *tenella* Ren.

RAYDALE SIDE AND SEMMERWATER.

On the west side of Semmerwater, amid the beautiful Bird's-eye Primroses and the Globe-flowers, is an association of mosses not often met with. They are:—

HYPNUM GIGANTEUM Schp.

HYPNUM WILSONI Schp.

HYPNUM REVOLVENS Sw. var. COSSONI Ren.

AMBLYSTEGIUM FILICINUM DeNot. var. VALLISCLAUSÆ Dixon.

The opposite side of the water seems to be occupied by one moss only, *Cinclidotus fontinaloides* P.B., crowded with fruit.

The bases of the trees on the west side are carpeted with *Leskea polycarpa* Ehrh.

At Park Scar Fall are some interesting mosses :—

SELIGERIA DONIANA.

SELIGERIA TRISTICHA. (R. B.)

ORTHOTHECIUM INTRICATUM. (R. B.)

EURHYNCHIUM TENELLUM. (R. B.)

EURHYNCHIUM PUMILUM.

BARBULA SPADICEA, with a much thicker nerve than usual, and a large form of the hepatic

LOPHOZIA TURBINATA (Raddi) Steph.

At the High Force are :—

SELIGERIA TRISTICHA. (R. B.) Re-discovered at this visit.

TRICHOSTOMUM NITIDUM. (R. B.)

Mr. Barnes also found :—

PLEURIDIUM ALTERNIFOLIUM. At Bainbridge.

ENCALYPTA CILIATA. In Cragdale.

ZYGODON STIRTONI, also the hepatic CEPHALOZIA CONNIVENS, on Addelburgh.

MAMMALS.

Notes on the Water Shrew near Rotherham.—On the afternoon of 8th August I observed a Water Shrew in a branch of the river Rother at Canklow, two miles from Rotherham, and a colliery centre. I have also seen the species at Kiveton Park and Lindrick Dale, both in this district. The animal seen yesterday was not shy and approached to within a few feet, and I watched it for some time through a good glass. The stream is covered with Potamogeton and Lemna, and it was seeking food on these and along the bank with feverish energy, very different from the placidity of the Water Vole; it progressed with short rodent-like rushes, and used its snout as a tactile organ for finding its prey underneath the pond-weed leaves, the head being continually turned from side to side. It found grubs or worms, which were held in the fore-paws and worried in the manner of a carnivore; when devouring them it always turned to the bank and distinctly chewed the food, the snout then being pointed upwards. It dived to the bank at any sound, but soon reappeared.—C. F. INNOCENT, Sheffield, 9th August 1905.

FUNGUS FLORA OF YORKSHIRE.*

THE completion of the fourth volume of the Botanical Series issued by the Yorkshire Naturalists' Union is an event which will be welcomed by botanists not only in our broad-acred shire, but throughout the country. Yorkshire is to be congratulated upon having its well-organised and successful Union of Naturalists, in which the foremost naturalists work harmoniously together, not only for the benefit of their own county, but greatly to the advantage of natural science. Under the auspices of the Union a volume of miscellaneous botanical papers and addresses was published in 1891. In 1888 appeared Lees' well-known 'Flora of West Yorkshire,' probably the most complete flora ever issued for any district. Some years ago Baker's 'North Yorkshire' was revised and reprinted in parts by the Union, and we understand that this is practically finished and will be ready very shortly. These two floras, together with Robinson's 'Flora of East Yorkshire,' recently issued by the Hull Society, practically monograph the higher forms of vegetation in the county. 'The Alga Flora of Yorkshire,' by W. and G. S. West (1901) deals with the lowest plants, leaving only the lichens and the fungi to be dealt with.

A systematic study of the fungi of the county was commenced some years ago on the formation of the Yorkshire Mycological Committee. This Committee was exceedingly fortunate in securing the services of Mr. Massee as chairman, whose practical interest has been most helpful, and Mr. Crossland as secretary, whose untiring energy and enthusiasm at once infected the remainder of his Committee. At the ordinary meetings of the Union, and particularly at the annual fungus forays held in different parts of the county, the various members of this Committee have worked conscientiously, and naturally have accumulated much material relative to the subject. The first instalment of the 'Fungus Flora,' as Part 28 of the Union's 'Transactions,' was published in November 1902. This, however, only contained 48 pages. It became obvious that, if published in the ordinary way in the 'Transactions,' several years must necessarily elapse before the completion of the work.

* 'The Fungus-Flora of Yorkshire,' by G. Massee, F.L.S., F.R.H.S., and C. Crossland, F.L.S., 400 pp., 8vo. A. Brown & Sons, Ltd., 5, Faringdon Avenue, E.C. Cloth, 10s. 6d. net.

At the foray held at Helmsley in 1903 the Committee decided to proceed with the work at once, which has resulted in the excellent volume now before us—the first independent fungus flora issued for any county.

An idea of the nature and extent of the records may be obtained from the fact that the present volume contains particulars of 2,626 species, compiled from 16,700 records, arranged under the five vice-county divisions of H. C. Watson. Yorkshire consequently includes in its area considerably more than half of the species of fungi recorded for Great Britain.

The Flora is not a bare list of the species occurring in the county. In addition to the localities in which they have been found, particulars are given in numerous instances of the host plant in the case of parasitic species; and the habitat of saprophytes is almost invariably appended. Often special characteristics possessed by the fungus are noted. Nor has the economic side been overlooked, numerous and extensive notes on the ravages of destructive parasitic species are given. The word 'edible' is added in most cases where the fungus is known to possess esculent properties. A table on page 8 summarises the genera and species included in the Flora; also the number of species thus far recorded for each vice-county. Appendices I. and II. bring the work up to date of publication. In this way the book is economically of much value.

Apparently the publication of the 'Yorkshire Fungus Flora' by no means infers a cessation of the work of the Mycological Committee. We learn from the introduction that 'many new county, and a few new British, records are added each year. Increased interest is being taken in this branch of botany, and the accumulation of new records is constant. Seeing that such a vast proportion of the county remains to be thoroughly investigated, there is plenty of scope for new discoveries. What is possible in this direction may be gathered by referring to the Scarborough and Hebden Bridge records, in comparison to all others. The fact is here made clear that paucity of records for any given district implies lack of investigation rather than absence of fungi.'

In congratulating the Union upon the excellent piece of work it has published, special praise should be given to the authors for the thorough manner in which they have done their work. The printing, paper, and general 'get up' of the volume are all that can be desired.

FIELD NOTES.

BIRDS.

Arctic Tern at Spofforth.—An adult Arctic Tern, in full summer plumage, was picked up dead on Spofforth Hags on June 17th. Whatever caused this beautiful bird to wander so far from its breeding haunts in the height of the nesting season is a mystery.—R. FORTUNE, Harrogate.

Nesting of the Tufted Duck and Great Crested Grebe in Nidderdale.—Last year a pair of Great Crested Grebes nested in Nidderdale and successfully reared a brood of three young ones. They have again nested this year but have only managed to rear one young one. Three pairs of Tufted Ducks have also nested in the same locality, the exact position of which, for obvious reasons, it is not wise to specify. A pair of Little Grebes have their third nest, which to-day, July 15th, contains four fresh eggs.—R. FORTUNE, Harrogate.

REPTILES.

Adders and Grass Snakes, the latter especially, some of which are unusually large, have been very abundant in the neighbourhood of Harrogate this year. Has a similar increase in numbers been noticed in any other part of the county.—R. FORTUNE, Harrogate. [Grass Snakes are very common this year near Hull.—T. S.]

FLOWERING PLANTS.

***Astragalus danicus* Retz. (vel. *A. hypoglottis* Linn.).**—This plant, together with a rather small-flowered form of *Polygala*, was found on Whit Monday, 12th June, growing rather freely on roadside grassy mounds, between the village of Garton-on-the-Wolds and the monument to the late Sir Tatton Sykes, near Sledmere. This pretty little purple milk vetch was previously known in only two other East Riding localities—Langton Wold and Brandesburton.—J. FRASER ROBINSON, Hull.

***Serratula tinctoria* L. near Doncaster.**—Dr. Selby, who had discovered the above-named plant growing near Bentley, about one and a half miles from Doncaster, took me to the station for it on Tuesday last. There we found it in fair abundance, but limited to a small area on the side of the Great Central Railway. As records for V.C. 63 are somewhat meagre, I thought this worthy of note.—H. H. CORBETT, Doncaster, 3rd August 1905.

Lincolnshire Plant Notes.—At the Stamford meeting of the Lincolnshire Naturalists' Union, on 29th June, a large number of plants was taken; the best being *Ænanthe fluvialis*, in ditch bed at Newstead Mills, and *Cardamine amara* on the banks—the soil was modern freshwater alluvium; *Galium tricornne* on Great Oolitic Limestone in Stamford quarries, and *Trifolium ochroleucon* in quantities on upper estaurine deposits; *Geranium columbinum* also on freshwater alluvium.

At the Linwood meeting of the Louth Naturalists', etc., Society, on Whit-Monday, the best plant taken was *Lycopodium clavatum* L. *Veronica scutellata* var. *hirsuta* Weber was seen once more on the only known spot in Lincolnshire—a marshy pit on the way to the Warren.—A. SMITH, Grimsby.

◆◆◆ COLEOPTERA.

***Stenolophus elegans* Dej. : an addition to the Yorkshire list of Geodephaga.**—On 15th May 1903, while working for water-beetles in the, then, flooded ditches of Thorne Moor, I took a small geodephagous insect, which on examination I concluded was the above-named species. Having to-day again examined it with Mr. Bayford, and having compared the descriptions in the works of Cox, Dawson, and Fowler, I think that there is no doubt that the diagnosis is correct. The only localities given for the species in Fowler are all in the south-east of England, viz., Gravesend, Sheppy, Sheerness, and Deal.—H. H. CORBETT, Doncaster, 10th August 1905.

◆◆◆ LEPIDOPTERA.

***Acidalia emutaria* near Spurn : an addition to the 'List of Yorkshire Lepidoptera.'**—I beg to record an addition to the 'List of Yorkshire Lepidoptera,' namely, *Acidalia emutaria*, two specimens of which I took at Kilnsea, near Spurn, on 27th June last, and about which there is no doubt whatever as to the identification. They were flying about 10.30 p.m. at the Kilnsea end of the 'Warren,' near the sea, where the ground is marshy, with rushes growing in patches. No doubt I might have got more, but did not know what I had taken at the time.—F. EMSLEY, 107, West Street, Leeds, 2nd August 1905.

[This is a most interesting addition to our list, but as the species has already been recorded as occurring on the South Lincolnshire coast its presence near Spurn is not surprising.—G. T. P.]

REVIEWS AND BOOK NOTICES.

The Camera in the Field. F. C. Snell. T. Fisher Unwin. 5s.

In this book the author's object is to give instruction to the beginner in natural history photography. He also describes and figures such subjects as can be secured by the ordinary worker. He does not consider the needs of the privileged person who indulges in the practice of scaling precipices and dangling over cliffs in his desire to snap-shot the breeding-places of rare birds. Mr. Snell first describes the camera and the dark room, and



Caterpillars of the Early Thorn Moth (four).

gives very useful hints for the successful photographing of birds and their nests, reptiles, mammals, insects, and plants. He also figures and describes his various devices for successful work, numerous examples of which are given (and sometimes repeated) in the volume. One of these we are permitted to reproduce. It is a most useful work on the lines pointed out. The only part of the book we do not like is the cover.

The Cultivation of the Common Hare. A Lecture by the Rev. E. A. Woodruffe Peacock, F.L.S., F.G.S., etc.*

In this pamphlet the author points out that there are three varieties of the English Hare, the fur being thicker or thinner according as they belong to the northern, central, or southern parts of the country, so that their coat may suit the varieties of climate.

The Mountain or 'Blue' Hare, of the Scottish Highlands, is a distinct species of totally different habits, and not known to interbreed with its southern connections. It takes to holes among the rocks almost like a Rabbit, whereas the English Hare never goes to ground except in very rare cases, where it is very hard pressed by its pursuers, when it may seek

* 'Rural Studies Series,' No. 7. J. W. Goulding, Louth, 1s.

shelter in a drain tunnel or a burrow. Like the Ptarmigan, it generally turns white in the winter, this again being a case of 'adaptation' to protect it in the snowy north. English Hares also, in our northernmost counties, have a tendency to whiten, for the same purpose.

In some parts of Lincolnshire albino Hares recur at irregular intervals, the writer of this note having a long list of such cases, extending over the last 30 years. In Norfolk there is a grey variety.

'Mad as a March Hare' is a common saying, and in March they may be seen gambolling like frolicsome lambs.

Since the passing of Sir William Harcourt's 'Ground Game Act' Hares are unfortunately not so abundant as they were of old, to the loss of the labourer, who enjoyed the gift of a Hare from his master, as well as to that of the sporting master himself. The writer of this notice has shot to his own gun in 'a warm corner,' within an hour, more than 50 Hares—and could have shot double that number, but that his gun-barrels at times became too hot—where now hardly a score are killed in a whole season; and Mr. Peacock says that, three decades ago, he has seen over 50 playing together within an area of a few acres. '*Nous avons changé tout cela.*'

Mr. Peacock gives numerous anecdotes, showing the activity of the Hare; her sagacity in the ruses she can resort to in order to escape observation; how the young are reared and protected; their parents' language in love-calls and notes of warning; their choice of the soils they prefer to frequent; as well as the habits and tricks of some of their enemies, human or musteline.—J. C. W.

The Official Information Department of the Manx Government has issued a useful pamphlet setting forth the attractions of the Island.

The 'Report and Proceedings of the Commons and Footpaths Preservation Society,' just to hand, shows that much good work has been done by this society during the past year.

The twenty-sixth 'Annual Report of the Rochdale Literary and Scientific Society' is a record of a successful year's work. The society has 249 members, and there is a balance in hand of £65.

'Healthy Game' is the title of 'Rural Studies Series, No. 4,' recently issued by the Rev. E. A. Woodruffe Peacock (Goulding, Louth, One Shilling). In this the author points out the principal causes of disease amongst game, and the best methods to be adopted to prevent disease.

A paper by Messrs. G. Coffey and R. Lloyd Præger on 'The Larne Raised Beach,' published by the Royal Irish Academy (two shillings), demonstrates the value of the co-operation of geologist and archaeologist. It is one of the most interesting papers we have read for some time.

The thirteenth 'Quarterly Record of Additions to the Hull Museum' (Publication No. 25) has just been issued. It contains 48 pages, 24 illustrations in the text, and 2 folding plates, and is sold at one penny (A. Brown and Sons, Hull). The principal items are:—'The Plunger Beetle,' 'Wilberforce Relics,' 'Old Hull Paddle Boats,' 'Hull Whaling Days,' 'Relics from Meaux Abbey,' 'Barrow Antiquities,' 'Market Weighton Antiquities,' 'Early Hull Tobacco Pipes,' and 'Rare Hull Tokens.'

No. 5 of the 'Bradford Scientific Journal,' has been published, and contains papers on 'Bradford Botanical Garden,' by W. P. Winter; 'Afforestation of Water Catchment Areas,' by S. Margerison; 'Strange Story of a Dragon Fly,' by Mary Simpson; 'The Season's Migrants,' by R. Butterfield; 'A Prehistoric Weapon,' by G. H. Martin; and a further instalment of Jowett and Muff's 'Glacial Geology of Bradford and Keighley.' Judging from the illustration, we are not at all satisfied with the genuineness of Mr. Martin's prehistoric *stone club*. We notice that Mr. A. H. Pawson has presented over 300 valuable and well-established plants to the Bradford Botanical Garden. The 'Local Nature Notes' are a valuable feature.

Naturalist,

NORTHERN NEWS.

We regret to record the death of Dr. W. T. Blanford, past-president of the Geological Society of London, in his 73rd year.

The Rev. E. M. Cole reprints a short paper 'On the Place-Name Wetwang' from the Saga Book of the Viking Club.

Mr. J. W. Tutt is proposing to issue a new history of British Butterflies. 'The paper on which the notes are written weighs possibly more than a quarter of a hundredweight.'

By order of the Royal Hungarian Ministry of Agriculture, Otto Herman (Editor of 'Aquila') has issued, in English, 'Reversio critica automatica of the Doctrine of Bird Migration,' with Map.

Amongst the donations to the Newcastle Museum we notice 'Fine antler of Red Deer, with part of skull attached, from the submerged forest, Hartlepool; found in 187—'—presented by C. T. Trechmann.

A Montagu's Harrier was shot at Rainworth (Notts) in June. The Merlin nested in North Derbyshire this year. A Rustic Bunting (*Emberiza rustica*) is recorded near Seaton Sluice, Northumberland ('Zoologist,' July).

A significant 'N.B.' appears at the foot of a notice recently issued by a south Lancashire Field Naturalists' Society, viz.:—'Members who omitted to pay for refreshments at the last meeting would oblige by *doing so*,' etc.

A full-grown example of *Vertigo substriata* m. *sinistroisum*, found at Shipley Glen in 1898, is recorded in the 'Journal of Conchology' for July. The same publication contains particulars of a sinistral form of *Vivipara conlecta* from Southport.

Together with Mr. R. Shore, Mr. G. F. Atkinson (who joined the Yorkshire Fungus Foray at Helmsley) has written a useful pamphlet, 'Mushroom Growing for Amateurs.' This is well illustrated, and is issued as Bulletin 227 of the Cornell University.

Mr. W. Harrison Hutton (Leeds) contributes a short note on 'The Banded Shell, *Helix nemoralis*,' to the July 'Nature Study,' and Mr. D. W. Bevan (Scarborough) writes on 'Seaweed: a holiday paper for Field Botanists,' to 'Knowledge and Scientific News' for August.

'Pamphlet I. Suggestions for beginning Survey Work on Vegetation,' is reprinted from the 'New Phytologist' for the Central Committee for the Survey and Study of British Vegetation. It has been sent to us by Dr. W. G. Smith, of the University of Leeds, who is Secretary of the Committee.

'Nature Study' for August is largely occupied by reports of the excursions of the Lincolnshire Naturalists' Union, by Mr. A. Smith (Grimsby). The boulders of 'augatite' and 'Labrador Porphyry' recorded at South Elkington seem to be unfamiliar to us, and we doubt if much good results from recording such plants as 'Bellis perennis.'

Mr. G. W. Gibson, of 26, St. John's Street, Bridlington, sends us a dozen excellent photographs taken on the occasion of the recent visit of the International Ornithological Congress at Bempton. In addition to views of the cliffs and the 'climbers,' there are photographs of the members of the Congress and others. They are half-plate size, and sold at 5s. the set.

In his address delivered at the Anniversary Meeting of the Geological Society of London, Prof. J. E. Marr directed attention to the Classification of the Sedimentary Rocks. Prof. Marr opines that 'In an ideal classification of the sedimentary rocks we require a triple nomenclature, in order to subdivide the rocks according to lithological characters, organic contents, and periods of formation.'

Referring to the note on the large Guillemot egg from Speeton (ante, p. 245), Mr. Thos. Midgley, of the Chadwick Museum, Bolton, writes:— 'On reading the note re large Guillemot egg from Bampton, I measured some of ours—we have about 700 well-selected examples. I could not find any exceeding yours in width, $2\frac{5}{16}$ in., but we have two or three over $3\frac{5}{8}$ in. in length and well proportioned, and one I measured $3\frac{1}{2}$ in. by $2\frac{1}{16}$ in. from Speeton.'

Wilberforce House, the birthplace of William Wilberforce, an Elizabethan building of particular interest, is to be opened ere long as a museum illustrative of the history of Hull. Part of it will also be occupied by relics of Wilberforce. At the present time it is being restored to its original condition, as near as possible, having been used as offices in recent years. The new museum is under the charge of the city curator, Mr. Sheppard, who will be glad to hear of suitable objects for exhibition therein.

Dr. F. A. Bather contributes a note on 'A Wind-worn Pebble in Boulder Clay' [Lancashire] to the August 'Geological Magazine.' In the same journal Mr. C. Davies Sherborn gives a few extracts from the Catalogue of the Humphrey Museum (1779), which has been discovered in the Hancock Museum, Newcastle. From this we quote three items:—Two Magpies, a devil, a painted Cockle, a sun, two false Guinea admirals, and two Otaheite cowries; two Ass's ears, a devil, two figs, two blackamoor's lips, and six more; an oriental devil of the first magnitude, very fine! Mr. Sherborn prints the extracts 'as an illustration of the matter that interested the scientific, and awed the vulgar, in those days.'

Two British interments, accompanied by ornaments, etc., of bronze and gold, are reported from Luton. The find was reported to the coroner, who suggested that the remains should be interred in the churchyard. Strangely enough this was acted upon, an undertaker placed them in two coffins, and they were taken in a hearse to Biscot churchyard, where the vicar, in the presence of a policeman, officiated. In addition to the human bones buried in this way was 'a rib bone of a sheep, a piece of a rib of beef, a bone of a rabbit, and another of roebuck.' Shining breastplates were screwed on the coffins, inscribed 'Bones found at Leagrave, July, 1905.' We know one or two Yorkshire museums which could supply work for the coroner and clergy in this way for months!

The theories of glacial geology are evidently beginning to filter into the popular mind with not much more than the amount of transmogrification usual with scientific theories in such cases. At the recent meeting of the Yorkshire Geological Society in Teesdale, a member retailed—and vouched for the accuracy of his version—a science lecture which he had overheard on Seamer Station respecting the great boulder of Shap in the station-master's garden:—First countryman: 'Diz tha see that steean?' Second countryman: 'Ey! an' a big un it is, an all.' First countryman: 'Ah've heeard tell at it rowled here fra Lake Disthrikt.' Second countryman: 'Thoo niver says!' First countryman: 'Bud ah deeah; an' what's mare, when it started rowlin', *it was a lahtle conny steean, neeah bigger than a hen egg.*'

The following note appears in the 'Hull Daily Mail' of 20th June:— 'For some time the movements of a pair of gulls in Pearson Park [Hull] had been under observation. In course of time it was seen that a nest had been built near the bandstand, and that an egg was receiving the attention of both birds. One morning the parkmen found the egg had been stolen. . . . Later in the day a lad turned up with the egg. He had taken it from the nest and conveyed it home as a trophy, and his father ordered that it should be restored. By this time there was an ominous chip in the side of the egg. It was replaced in its nest. The mother bird soon discovered her lost property, and straightway resumed her sittings. Incredible as it may seem, a young bird was hatched during the same or the following day, and when last I heard of it it was flourishing apace.'

Naturalist,



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A

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NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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MEMBERSHIP of the Yorkshire Naturalists' Union, 10/6 per annum, includes subscription to *The Naturalist*, and entitles the member to receive the current *Transactions* and to all other privileges of the Union.

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NOTES AND COMMENTS.

MANCHESTER MUSEUM.

In the 'Report of the Manchester Museum, Owens College,' just to hand, we are surprised to find the following:—'In presenting this annual report it has been usual to defer the consideration of finance to the end, but the present position of the Museum in this respect demands that attention be called to the matter at the outset. . . . The present financial position of the Museum is exceedingly unsatisfactory. The year opened with an adverse balance of over £75, which has increased to nearly £200, and this in spite of strict economy and the postponement of many purchases which are necessary, if progress is to be made. . . . Attention has year by year been called to the inadequacy of the income.' The excellent work being accomplished by Dr. Hoyle and his staff is well known, and it is a matter for surprise that in a city like Manchester a Museum should be crippled for the sake of a small increase in its income. It is sincerely to be hoped that the public of Manchester—either collectively or individually—will respond to the appeal made in the report referred to, and thus enable the Manchester Museum to maintain its present position amongst the Museums of Britain.

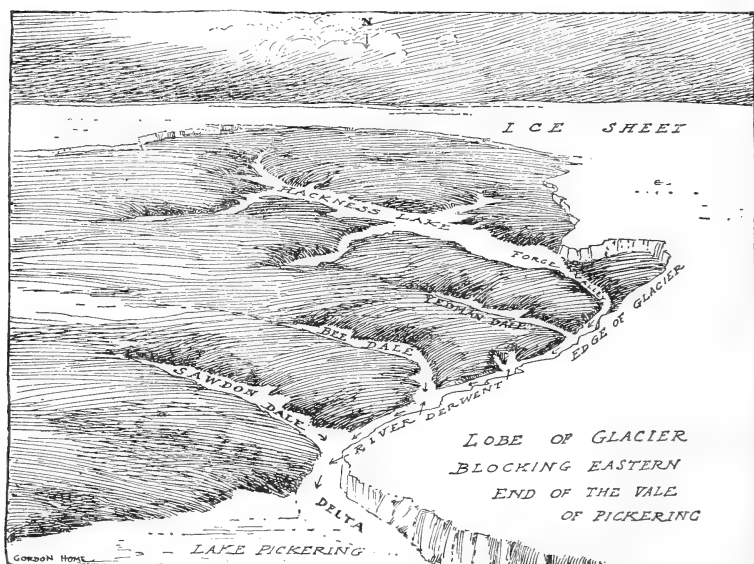
MACHINE-MADE EOLITHS.

From a note appearing in 'Man' for August, it would almost appear that at least one type of pre-historic implement, the 'eolith,' is in danger of being put aside as evidence of human handiwork, as a result of some machine-made examples reported from Mantes. 'By its natural constitution the local [Mantes] chalk contains numerous unbroken flint nodules, which have to be removed before it can be used for cement. In order to effect this separation the blocks of chalk are placed in a receiver full of water, to which a rotary motion is communicated. After 29 hours the chalk is completely refined, and the flint is left deposited on the bottom of the vessel like a bank of gravel. But during the operation of this artificial whirlpool the nodules have been rolled one over the other and exposed to every conceivable kind of pressure and shock. At the conclusion of this process . . . the great majority presented examples of all the eolithic forms. The similarity of the specimens to the prevalent eolithic types was so close that they could not possibly have

been distinguished from actual eoliths.' The promised 'full account of the pseudo-eoliths' will be awaited with interest, as well as the opinion of English archæologists thereon.

PICTURESQUE PICKERING.*

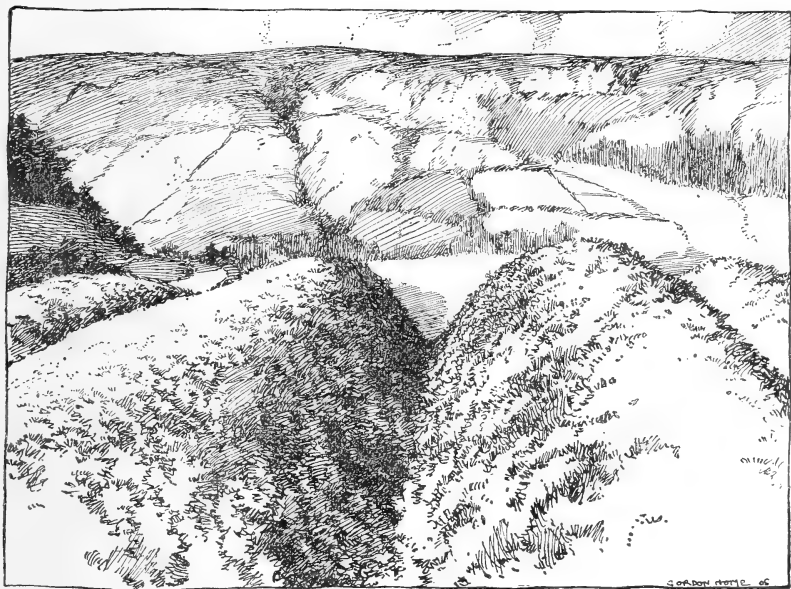
We recently referred in these columns to the charming work on 'Yorkshire Coast and Moorland Scenes' which had been written by Mr. Gordon Home. The same author has now produced another work excelling in every way its predecessor, which is perhaps the greatest compliment that can be paid to it. In the 'Evolution of an English Town' the author writes the story of the ancient town of Pickering from the earliest times to



the date on which his book was printed. Pickering is unquestionably an ideal place for such a purpose, inasmuch as within its immediate vicinity occurs a number of relics of the past, representing each principal period in the history of the 'broad-acred shire' towards the eastern extremity of which the town is situated. To use the author's own words he has 'endeavoured to produce a complete series of pictures, commencing with the Ice Age and finishing at the dawn of the twentieth century. Much of the work is of particular value to naturalists and those interested in prehistoric remains. Mr. Home commences with

* 'The Evolution of an English Town,' J. M. Dent & Co. 10s. 6d.

a description of the famous hyæna cave at Kirkdale, then follows a description of the Ice Age and Lake Pickering based upon Prof. Kendall's recent researches. Accompanying this section of the book is an admirable reproduction of Kendall's well-known map of the Glaciers and Glacier Lakes of the Cleveland area, as well as some imaginary sketches by Mr. Home of the probable appearance of the country at that far-off time. The various tumuli and other prehistoric remains which abound in the district (a number of relics from which are preserved in Mr. Mitchell's Museum at Pickering) enable Mr. Home to give an entertaining summary of our knowledge of this interesting period. Following this is an account of the Romans, Saxons,



Scamridge Dykes above Troutsdale.

and later peoples. The ancient forests are dealt with somewhat exhaustively, in which is recorded that 'Thomas Wake, of Liddell, claims to have a free chase for fox, hare, *wild cat*, and badger, within the boundaries of his barony of Middleton, namely, from the place called Alda on the Costa to the standing-stone above the Spital Myre of Pickering, etc.' Some very brief notes on the birds, etc., of the district are given from the pen of Mr. Oxley Grabham. Throughout the book are numerous illustrations from photographs and from the author's own sketches. Two of the latter we are permitted to reproduce.

WHAT'S IN A NAME?

A somewhat extraordinary instance of the naming of a new species occurs in the 'Annual Report of the North Staffordshire Field Club for 1904-5' (Vol. 39). Sir Thomas Wardle figures and describes a new 'Fossil Fern from Butterton.' This specimen, which was 'simultaneously observed' by Mr. Howe and himself, occurred in a bed of black shale in the Pendleside Series. Sir Thomas then proceeds to give his reasons for considering the plant to be a new species: 'Let me try to establish my case; but is it not natural that the wish should be father to the thought and awaken old temptations to honour our own neighbourhood? . . . I have therefore decided to name it *Adiantites Wardlei* Howe!' That is to say, as a result of Sir Thomas Wardle's naming the species, Mr. Howe gets the credit of naming it after Sir Thomas. If it should not be a new species at all, where will Howe come in?

**The Preservation of Antiquities: a Handbook for Curators.**

By **Dr. F. Rathgen.** Translated by **Drs. G. A. and H. A. Auden.** Cambridge University Press. Price 4s. 6d. net.

In this little book the author collects together the various plans adopted for the preservation and restoration of antiquities, whether of metal, glass, stone, or earthenware. How frequently it has happened that valuable relics have slowly but surely wasted and become entirely lost in consequence of the owners not knowing how to preserve them. This is particularly the case with iron objects. The present work shows how this may be prevented. The author first reviews the various causes of destruction, and naturally some little chemical knowledge is necessary in following this part. The methods of preservation, however, are dealt with in simpler language. Some of these appear to be rather elaborate, though in view of the necessity of preserving, once and for all time, objects of historic interest, it is essential that the very best means should be adopted. Photo illustrations are given, showing various objects in bronze, iron, clay, etc., before and after treatment. Some of these are from the 'Danes' Graves near Driffield, York, and other places. Diagrams are also given illustrating the methods of preparation of the objects. The translators have certainly earned our gratitude for placing this useful work in a handy form for English readers.

Wasps Social and Solitary. By **G. W. and E. G. Peckham.**

A. Constable & Co. London. 6s. net.

This volume is one of the most instructive and entertaining that we have read recently. It contains thirteen chapters, all being written in such a charming manner, and at the same time so obviously based upon actual observation, that no one perusing them can fail to obtain some useful information. Part of the matter was published some years ago by the Wisconsin Biological Survey, under the title of 'Instincts and Habits of Solitary Wasps.' These chapters, however, have been revised and added to, and contain the results of further researches. The volume is profusely illustrated, and whilst we can especially recommend it to younger readers, it can certainly be read with pleasure and profit by more experienced naturalists. We heartily congratulate Mr. and Mrs. Peckham on their delightful book.

YORKSHIRE NATURALISTS AT BARNSELEY.

THE district around Cudworth and Barnsley was chosen for the 190th meeting of the Yorkshire Naturalists' Union on Saturday, 9th September, and there was a very representative attendance—most of the sections being under the guidance of their officials.

A start was made at Cudworth Station, where some sections in the drift on the line side were examined by the permission of the Midland Railway Company. The route was then taken to Grimethorpe and Brierley, and on to Barnsley—the geologists going viâ Houghton Common, and the botanists, etc., mainly confining their investigation to the various woods in the district.

After tea the meetings were held in the new rooms of the Barnsley Naturalists' Society—admirable for the housing of the society's collections and the holding of its meetings. The lower room is well arranged as a museum, in which, after the meeting, the evening was pleasantly spent. Amongst the collections there exposed are some most valuable specimens of local interest—coal-measure fossils, birds, and antiquities being, perhaps, the most important. One or two objects of more general interest also occur side by side with those enumerated, on account of the somewhat limited space at the society's disposal. There is no doubt that a very valuable educational institution could be made in more commodious premises, and it is a crying disgrace to a town the size of Barnsley that it has not its public building devoted to the purposes of a museum, particularly as we feel sure the Barnsley Society would present its collections to the town were a suitable home for them provided and maintained at the public expense. There are plenty of men in the town and district who have the right ideas as to the nature of a local museum.

At the general meeting, which was presided over by Mr. G. T. Porritt, various reports on the day's investigations were given, and are printed below. Votes of thanks were also passed to those who had assisted in the success of the meeting, as well as to the landowners for permission to go over their estates. Some new members were elected, and the recently-formed Goole Scientific and Naturalists' Society was affiliated with the Union.

For the Vertebrate zoologists the secretary, Mr. A. White, reports:—A stormy, blustering day, with occasional showers, in the month of September, is scarcely an ideal day from an ornithologist's point of view. Thirty-one species of bird life were noted; there was an abundance of Wood Pigeons, together

with their eggs. The Warbler family was scarce, only one individual, the Willow Warbler, being seen. Perhaps one of the most interesting sights was on the return journey to Cudworth. Within a space not more than 50 yards were some thousands of Swallows; evidently they were on the point of migrating. Probably if the weather was not too boisterous they would start that night on their long journey southward. These birds were crowding one another on the boughs of a few bold willows and clinging by hundreds to the sheltered side of an old wall. The Red-legged Partridge, from being practically unknown in the immediate neighbourhood ten years ago, has now become quite common, and a great many are shot every season. Last September a Quail was shot at Brierley. The White-tailed Eagle mentioned in the circular, which is now in the possession of Mr. J. Dymond, of Burntwood Hall, was not shot on his property, and he was very sorry the bird was killed. The bird was shot near South Kirkby Quarry, about a mile from Burntwood Hall. A great number of Rabbits and a male Stoat were also noticed.

Owing to the unsuitability of the ground traversed the meeting was not a success from a conchological standpoint, and Mr. J. E. Crowther reports that the only two slugs noted during the day were *Arion hortensis*, in the lane near Grime-thorpe, and *A. minimus* just after leaving Spring Wood. The land shells were:—*Hyalinia nitidus*, *H. fulvus*, and *Helix rotundata*, all found together in Spring Wood. The following freshwater species were taken in the canal before the commencement of the excursion, viz.:—*Limnæa pereger*, *L. stagnalis*, *Planorbis albus*, *P. carinatus*, *P. vortex*, *Bythinia tentaculata*, *Vivipara vivipara*, *Valvata piscinalis*, *Unio tumidus*, *Anodonta cygnæa*, *Spherium rivicola*, *S. corneum*, *S. pallidum*, and *Pisidium fontinale*.

Mr. A. Whitaker writes that several slight showers prevented the entomologists from doing much 'larva beating,' otherwise some good species would probably have been obtained in this way. Amongst those which were so secured mention may be made of *L. camelina*, *N. dromedarius*, *A. betularia*, *E. punctaria*, and *H. prasinana*, which were not uncommon, also *I. luctearia*, *E. lariciata*, *F. piniaria*, *L. marginata*, and *P. beucephala*, of which odd specimens were noted. One of the larvæ of *L. camelina* was of a uniform pink colour, a form which is very rare. A few fine larvæ of *B. rubi* and *B. quercus* var. *callunæ* were noted on the commons.

Mr. G. T. Porritt states that very little was done among any branch of the Neuroptera. Several specimens of the fine and pretty dragonfly *Æschna cyanea* occurred about New Park Spring Wood; and of Trichoptera *Stenophylax latipennis* and *Drusus annulatus* were noted.

Mr. E. G. Bayford writes that the representative of the Coleoptera Committee was Mr. J. W. Carter, who found beetles extremely scarce, three species of Coccinellidæ being all that fell to his lot. An additional species of the same family was taken by Mr. A. Whitaker. The four species were:—*Adalia bipunctata* L. var. *humeralis* Say., *Coccinella 10-punctata* L., *C. 7-punctata* L., *Halysia 14-guttata* L. Amongst the Homoptera Mr. Whitaker took a specimen of the very pretty *Tettigonia viridis* L.

Mr. C. Crossland reports that Botany was largely confined to the collecting of fungi, the time of the year being far gone for flowering plants and the right time for the other. Several Barnsley and Sheffield members responded to the hope expressed in the circular that local societies would interest themselves in investigating the fungi of the district. There were also a few ladies present who proved diligent collectors. Unfortunately the day was far advanced when we got to work—one o'clock—and rain being feared, toes were turned towards Cudworth Station by half-past three. Only two of the three woods on the programme—New Park Spring and Lady Cross, near Grime-thorpe—were visited. Mr. Snelgrove collected those marked ** in the list on Houghton Common, and one, a *Cantharellus* not yet determined, on Ferrymoor, between the station and Grime-thorpe. Though a considerable portion of the floors of the two woods are bracken-covered, there was no lack of fungi of the commoner kinds. The edible *Amanita rubescens*—the 'blusher'—was exceedingly plentiful; its dangerous 'double,' to unpractised eyes—*A. pantherina*—was there also, but only in small quantity. *A. muscaria* was looked for in vain among the birch and bracken, two of its favourite companions. There was any amount of *Boletus flavus*, and no lack of the *silvicola* var. of *Agaricus campestris*—mushroom—in the rides. The ubiquitous *Hypholoma fasciculare* was at work on nearly all the numerous rotting stumps, often joined by *Mycena galericulata*. During a short halt specimens from all sides, and from an outlying pasture, were brought to the spot, and the pile rapidly grew. A general conversation was held here, evincing unusual interest in the subject, while the heap was being sorted. There being

few rotting branches on the ground, micro-species were conspicuous by their absence, not even *Mollisia cinerea*, nor a single Myxomycete were seen. *Eccilia Parkensis*, among grass, and *Galera rubiginosa*, among moss, from Houghton Common, have each only one previous Yorkshire record, the former for East Keswick, near Harewood, 1898, and the latter for Mulgrave Woods, 1900. The following is a running list, given simply for distribution purposes. Students for whose benefit it is given may easily find the group to which each belongs by aid of the recently published 'Yorkshire Fungus Flora.' All but the double-starred species are from the two woods mentioned, and an adjoining pasture. The species marked * were gathered in the pasture, or the open grassy rides.

LYCOPERDON PYRIFORME.	*PANÆOLUS PHALÆNARUM.
SCLERODERMA VULGARE.	*PSILOCYBE SEMILANCEATA.
ITHYPHALLUS IMPUDICUS.	PSILOCYBE SPADICEA.
AMANITA PANTHERINA.	PSILOCYBE FÆNISECII.
AMANITA RUBESCENS.	COPRINUS ATRAMENTARIUS.
*LEPIOTA PROCERA.	COPRINUS NIVEUS.
ARMILLARIA MELLEA.	PAXILLUS INVOLUTUS.
TRICHOLOMA TERREUM.	*HYGROPHORUS COCCINEUS.
*TRICHOLOMA PERSONATUM.	*HYGROPHORUS CONICUS.
*TRICHOLOMA GRAMMOPODIUM.	*HYGROPHORUS PSITTACINUS.
CLITOCYBE BRUMALIS.	LACTARIUS TURPIS.
LACCARIA LACCATA.	LACTARIUS QUIETUS.
COLLYBIA RADICATA.	LACTARIUS RUFUS.
COLLYBIA MACULATA.	LACTARIUS GLYCIOSMUS.
**COLLYBIA BUTYRACEA.	LACTARIUS VOLEMUS.
**COLLYBIA DRYOPHILA.	**LACTARIUS MITISSIMUS.
MYCENA RUGOSA.	RUSSULA CONSOBRINA.
MYCENA GALERICULATA.	RUSSULA EMETICA.
MYCENA STANNEA.	RUSSULA OCHROLEUCA.
*ENTOLOMA PRUNULOIDES.	RUSSULA FRAGILIS.
*ENTOLOMA SERICELLUM.	RUSSULA LUTEA.
*ENTOLOMA SERICEUM.	MURASMUS RAMEALIS.
NOLANEA PASCUA.	*BOLETUS FLAVUS.
**ECCILIA PARKENSIS.	BOLETUS CHRYSENTERON.
FLAMMULA SAPINEA.	BOLETUS SUBTOMENTOSUS.
*GALERA TENERA.	BOLETUS BADIUS.
*GALERA OVALIS.	BOLETUS SCABER.
**GALERA RUBIGINOSA.	POLYSTICTUS VERSICOLOR.
*AGARICUS CAMPESTRIS and	PORIA VAPORARIA.
var. SILVICOLA.	STEREUM HIRSUTUM.
STROPHARIA ÆRUGINOSA.	THELEPHORA LACINIATA.
*STROPHARIA ALBOCYANEA.	*CLAVARIA DISSIPABILIS.
*STROPHARIA STERCORARIA.	ERYSIPHE COMMUNIS.
*STROPHARIA SEMIGLOBATA.	On Knotgrass.
HYPHOLOMA SUBLATERITUM.	DASYSCYPHA VIRGINEA.
HYPHOLOMA FASCICULARE.	CORYNE SARCOIDES.
HYPHOLOMA LACRYMABUNDUM.	

With reference to the Geology, the report of Mr. Cosmo Johns, F.G.S., is as follows:—‘As might have been expected from a district so characteristic of the Middle Coal Measures, the country was rather featureless. The softness of the sandstones contributes to this and thus helps to distinguish the scenery from the Lower Coal Measures, with their bolder escarpments and the rugged grandeur of the Millstone Grit. The excursion was, however, by no means uninteresting. What was lacking in surface features was more than compensated for by the intimate knowledge of the structure of this portion of the Yorkshire coalfield that could be gleaned from the sections obtained during the sinking and working of the numerous collieries that are scattered over this great mining district. Before considering the structural details it would, perhaps, be better to refer to the interesting drift section seen near Cudworth Station. It is probably post-glacial in age, and the stream that runs through the cutting drains the Royston area so famous for its records of erratics. A careful search was not without reward, for a few quartz pebbles that could be referred to Millstone Grit and several fragments of Carboniferous chert were found. Mixed with the Middle Coal Measure pebbles were some much resembling gannister. The deposit certainly deserves more attention, and the local society might profitably devote some time to it. After leaving the drift our way lay through Ferry Moor, crossing the outcrops of the various rocks that make up the upper portion of the Middle Measures, until the breezy eminence known as Houghton Common was reached. This is formed by the Houghton Common Rock; towards the east the measures could be seen dipping gently under the Permian escarpment. The opportunity was here taken to discuss the less apparent structural features, and to assist this the intimate knowledge of the coal measures possessed by Mr. H. B. Nash, of Barnsley, was courteously placed at the service of the party. South-west Yorkshire owes its industrial prominence to the energy stored up in the famous Barnsley hard coal. Thus it was but natural that the changes this seam undergoes towards the north should have received attention. At Woolley, near Darton Station, the outcrop, which was not crossed during the visit, shows in ascending series 14 inches of ‘bottom softs,’ 30 inches of hard coal, 11 inches of clay seam with inferior coal. Then comes a parting of 6 inches of ‘spavin,’ followed by 33 inches of ‘top softs.’ Two miles away on the Wakefield side the seam has undergone a marked

change. The 'bottom softs' are only 6 inches thick, the hard 20 inches, and the clay seam 5 inches, while the 6 inch 'spavin' becomes 18 feet. At Monckton, only three miles from the outcrop, the parting is 14 feet thick. In each case the 'top softs' retain their usual thickness. This all points to some interesting changes in level during the formation of the seam. From an economic point of view the change is of vast importance, for a little further north the whole seam splits up and becomes almost worthless. It was very interesting to note that all the faults that have been proved in the district have been of the normal type.'

T. S.

Catalogue of the Lepidoptera of Northumberland, Durham, and Newcastle-on-Tyne. By J. E. Robson, F.E.S. ('Transactions Northumberland, Durham, and Newcastle Naturalists' Society.')

The third part of this catalogue (the first part of Vol. II.) treats of the Deltoides, Pyrales, Crambites, and to the end of the Tortrices. The same care and accuracy as characterised the previous parts is evidenced here, and the three first groups show up fairly well in number of species. The Tortrices also are well represented, but what cannot fail to strike every student of the group is that so very few localities are given for the various species. Mr. Robson tells us, indeed, in the preface that 'the west and north-west of Northumberland is almost untrampled ground to the entomologist,' and so far as work among the Tortrices is concerned the same might evidently be said of a considerably larger portion of the area included by the catalogue. Among the Pyrales and Crambites several very interesting species are chronicled, notably *Botys lupulinalis* and *Dioryctria splendidella* at Hartlepool, though both were apparently only casual specimens. The captures of *Pempelia davisellus* are surprising, and were it not that they were made by the late Mr. John Sang, who had an intimate knowledge of our native micro-lepidoptera, we should certainly have agreed with Mr. Robson that it is desirable that further confirmation should be forthcoming. The record of *Crambus cerussellus* is rightly given with considerable reserve, as it is at least as likely that the very different *Elachista cerussella* was the insect referred to. We notice that Mr. Robson rejects a record of *Sciaphila sinuana* as unlikely, because of its supposed southern range in Britain, but Dr. H. H. Corbett takes it in plenty at Doncaster, and it is also recorded from Bingley in Yorkshire. The Tineæ and Pterophori now only remain to be catalogued, and we look forward with interest to the completion of this valuable list.—G. T. P.

Elementary Microscopy. F. Shillington Scales. Ballière, Tindall and Cox. London. 3s. net.

In this useful little book the author has gathered together a series of articles which appeared in a contemporary. In their present form they are unquestionably of value, and anyone about to purchase a microscope, or to conduct any microscopical work, should certainly consult it. Typical microscopes of various well-known firms are figured, described, and compared. There is an appendix giving a list of works on microscopy, useful memoranda, etc., and the volume is suitably bound.

The Seventy-first Annual Report of Bootham School (York) Natural History, etc., Society is to hand. We are glad to notice that '1904 will be remembered as a year of renewed life and vigour in the club.' The pamphlet contains various reports under the heads of archæology, botany, entomology, etc., under each of which is a summary of the work accomplished in the season.

Naturalist,

MOSSES AND HEPATICS NEAR LEYBURN.

W. INGHAM, B.A.,

York.

DURING the week-end previous to the meeting of the Yorkshire Naturalists' Union at Askrigg I visited Leyburn, and, accompanied by Mr. Hartshorn, was able to visit several places in Wensleydale.

The following is the result of this pleasant little tour :—

WEISIA CRISPATA C.M. Grows on the limestone rocks close by Leyburn; also *Fissidens viridulus* Wahl. It was interesting to find the rare moss *Eurhynchium Teesdalei* on the face of Leyburn Shawl, far removed from water, near which it usually grows.

ZYGODON STIRTONI Schp. Is abundant by the fall at Redmire.

The following is a list of the plants observed :—

SCARTH NICK.

TORTULA MURALIS var. *RUPESTRIS* Wils.

TORTULA RURALIS Ehrh.

ENCALYPTA STREPTOCARPA Hedw. Very tall here.

LEUCODON SCIUROIDES Schwgr.

SIDE OF ROAD TO WEST BURTON.

BARBULA RIGIDULA Mitt.

HYPNUM HISPIDULUM Brid. var. *SOMMERFELTII* Myr. In large masses on a wall.

REDMIRE.

BARBULA CYLINDRICA Schp.

WEISIA TENUIS C.M.

WEISIA RUPESTRIS C.M. Abundant.

TRICHOSTOMUM CRISPULUM Bruch.

ORTHOTRICHUM CUPULATUM Hoffm. var. *NUDUM* Braithw. Abundant by the Fall.

ZYGODON STIRTONI Schp.

MNIUM ROSTRATUM Schrad.

BRACHYTHECIUM VELUTINUM B.&S. A large growth.

EURHYNCHIMUM CRASSINERVIVM B.&S. Fruiting abundantly.

The hepatics near the Fall at Redmire are interesting :—

METZGERIA FURCATA var. *ÆRUGINOSA* Hook.

LOPHOZIA TURBINATA (Raddi) Steph. Is here and on the face of Leyburn Shawl.

APLOZIA RIPARIA (Tayl.) Dum. Also occurs in the same two places.

PLAGIOCHILA ASPLENIODES var. *DILLENII* (Tayl.). Is abundant on vertical faces of rocks.

CHILOSCYPHUS POLYANTHOS (L.) Corda.

MADOTHECA PLATYPHYLLA (L.) Dum.

LEJEUNEA CAVIFOLIA (Ehrh.) Lindb. var. *PLANUSCULA* Lindb.

But the rarest Hepatic of Wensleydale grows by the side of the Fall at Redmire. Its name is *Pedinophyllum interruptum*

(Nees.) Lindb. var. *pyrenaicum* (Spruce). Mr. Macvicar has tested the plant. I found the type of this plant by the Strid in Bolton Woods, where it was first found by Carrington in 1857. The variety was also found in 1857 by Carrington on Malham Moor. The above, as far as I can discover, are the only certain records in Yorkshire of the type and the variety. The Redmire plant is an addition to North Yorkshire.

Landscape in History and other essays. By **Sir Archibald Geikie, F.R.S.**, etc. Macmillan & Co. 1905. 8s. 6d. net.

Sir Archibald Geikie's essays are always entertaining, and one cannot peruse them without being charmed with his literary style, as well as benefitted by the fund of information which he can so ably convey. The present work is no exception to the rule. It contains a collection of lectures and addresses which have appeared at intervals since the publication of 'Geological Essays at Home and Abroad.' Half of them deal with scenery in its geological relations and in its influence on human progress. Others discuss the problem of the age of the earth, whilst the 'Life and Letters of Charles Darwin,' 'Hugh Miller, his Work and Influence,' and 'Science and Education' also appear amongst the ten subjects dealt with. It would be difficult to find anything with which one could altogether disagree in Sir Archibald's writings. We should, however, like to know upon what evidence the statement is made (page 24) that 'a long tract of land, extending from Cork across the Bristol Channel and the Southern Counties to the coast of Yorkshire, has sunk fifty feet or more since the Neolithic period.' This may apply to the southern counties, but we know of no evidence of such a depression on the Yorkshire or Lincolnshire coast.

Animals I have Known. **Arthur H. Beavan.** T. Fisher Unwin. 5s.

This is evidently a companion volume to 'Birds I have Known,' by the same author, recently noticed in these columns. An idea of its scope is gathered from the author's preface:—'The object of this work is simply to record my experiences of animals in various lands, without reference to scientific theories as to their origin and distribution.' The book deals with British wild animals, British domestic animals, Australian animals, and South American animals. It contains some interesting reminiscences, though these at times are rather 'wordy'—for example, it takes three pages to describe how the author once saw a wild Cat, and bid it 'a hasty farewell.' Mr. Beaven evidently uses the word 'animal' in place of 'mammal' from the title to the last page of the book. On page 89 we find 'Bats. *A Bat an animal!* Is it not rather a bird with wings of skin?' (The italics are the author's.) The author's choice of illustrations is somewhat extraordinary. The chapter dealing with Hedgehogs is accompanied by two sketches—one being a drawing of very doubtful quality, the other showing a group of 'Hedgehogs skating!'—evidently culled from some children's story book. The index occupies almost a page.

The Annual Report for 1904 of the Scarborough Philosophical and Archæological Society includes that of the Scarborough Field Naturalists' Society. Each is evidently doing good work. The reports of the various recorders show that natural history in many of its branches is well represented in the Scarborough district, and they include many most interesting records. Mr. W. J. Clarke writes on the 'Vertebrata,' Mr. W. Gygell on 'Conchology,' Mr. R. Gilchrist on 'Arachnida' and 'Geology,' Mr. W. Pearson on 'Coleoptera,' Mr. A. S. Tetley on 'Lepidoptera,' Mr. J. H. Hargreaves on 'Marine Invertebrate Zoology,' Mr. E. B. Lotherington on 'Fungi, Lichens, and Algæ,' and Mr. E. R. Cross on 'Flowering Plants.'

Naturalist,

ON A SECTION IN THE BOULDER-CLAY NEAR WITHERNSEA.

THOMAS SHEPPARD, F.G.S.

THOUGH the erosion that is going on along the Holderness coast may be very unsatisfactory from the landowners' and farmers' point of view, geologists have every reason to congratulate themselves upon the ever-changing sections in the drift deposits which are presented to their view as a result of such erosion.



The district around Withernsea is perhaps particularly noteworthy from the fact that at Dimlington, a little to the south, the three divisions of Boulder-clay (Upper, Middle, and Lower or Basement) are visible together in section—the best locality for such a series in Yorkshire. Now that the importance and

significance of these separate divisions is being demonstrated, by the researches of Stather and others, any light that can be thrown upon the nature of the junction of the various divisions should be recorded—hence the present note.

As a rule the actual dividing line between the different boulder-clays consists of a thin layer of sand or gravel—through which small quantities of water trickle down on to the sands. Occasionally quite a massive bed of gravel occurs at the junction, whilst at other times the difference in the colour of the two clays has to be the principal guide—an occasional large boulder or pebble occurring along the line of division between the two.

Owing to the rapid rate of the erosion, and the soft nature of the clays, it does not often happen that a section is visible showing the upper surface of either of the lower beds of clay.

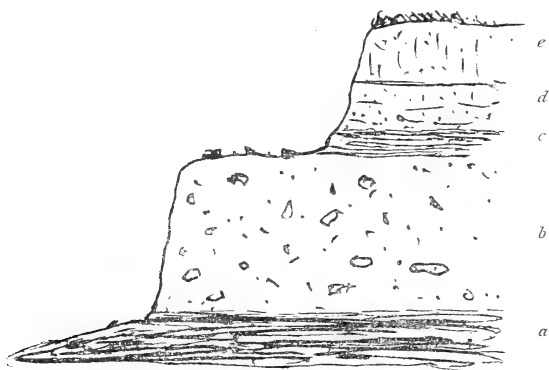


Fig. 1.

- a.* Beach.
- b.* Purple boulder-clay (15 feet).
- c.* Stoneless laminated clay (2 feet).
- d.* Fine gravel (5 feet).
- e.* Hesse clay—much weathered (5 feet).

In 'Geological Rambles in East Yorkshire' (1903), p. 22, I described a 'boulder pavement' which was exposed after a heavy wind on the beach a little to the south of what was then existing of the Withernsea pier. That section admirably showed a number of boulders and pebbles—embedded in the upper part of the Middle or Purple Boulder-clay—which were all on the same level, in nearly every instance striated on their upper surfaces. They were also orientated. The opinion was then expressed that this purple boulder-clay, with its embedded

boulders, had been over-ridden by the ice which deposited the upper or Hessele clay.

The section shown in the accompanying photograph occurs in the cliffs opposite Waxholme, about a mile north of the promenade at Withernsea. In a very unusual manner the upper part of the cliff has been washed away, leaving the top of the purple clay exposed in the form of a shelf or step. This has probably been due to the large amount of fine gravel occurring in the upper part of the cliff, which has been brought down by the percolating water.

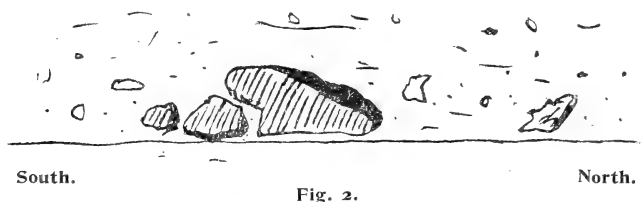
The cliffs at this point are 27 feet in height above the present beach. The lower 15 feet consists of Purple Boulder-clay (*b*, Fig. 1) crowded with various rock fragments, many scratched. Immediately upon and partly embedded in the upper part of this clay is a layer of boulders, principally Carboniferous rocks from Teesdale, many being of large size. Few are rounded, some sub-angular, and many angular. Small striæ occur on many of them—generally on the upper surface—though they do not all occur in the same direction. This flat shelf is exposed for about 25 feet, and is 12 feet in width. Upon this small area the following boulders are exposed, all being embedded in the clay, and on the same level:—

						in.
Carboniferous Limestone, angular	...	...	...	...	...	15 × 10
„ „ „	...	...	...	...	...	14 × 15
„ „ „	...	...	...	...	...	24 × 20
„ „ „	...	...	...	...	...	30 × 30 × 20
„ „ rounded	...	...	...	...	...	20 × 12
„ „ (rounded, with Encrinites)	...	...	...	...	...	12 × 10
„ „ (sub-angular)	...	...	...	...	...	20 × 15
„ „ „	...	...	...	...	...	14 × 15
„ Sandstone, angular	...	...	...	...	...	12 × 12
„ Conglomerate, sub-angular	...	...	...	...	...	30 × 24 × 20
Basalt, rounded	...	...	...	...	...	10 × 10
„ sub-angular	...	...	...	...	...	30 × 20 × 18
„ angular	...	...	...	...	...	20 × 18 × 12

There are also other boulders of smaller size. Immediately below these boulders, the uppermost few inches of the purple clay is of very dark colour, and is crowded with small angular fragments of various rocks, which have evidently been crushed whilst in their present position, as frequently the fragments are in juxtaposition.

This dark layer, as well as the line of large boulders, can be traced for some distance to the north and south. About 25 feet to the north of the section is a large boulder of a red rock

(probably Carboniferous Limestone stained with hæmatite) which has clearly been crushed out and the fragments partly separated by the southward movement of the ice (Fig. 2). Above the layer of stones is a finely laminated stoneless clay, about two feet in thickness (*c*, Fig. 1), which is a fairly constant feature in the Holderness cliff sections. The gravel next above this (*d*, Fig. 1) is very fine, the largest pebbles being 3 or 4 inches in diameter, whilst they average 1 or 1½ inches in diameter. They are generally waterworn, but there are a few sub-angular.



Mixed with the gravel is a large quantity of sand with a few thin layers of clay. The upper five feet of the cliffs consists of Hessle boulder-clay of the usual foxey-red colour, though it is here much broken and weathered (*e*, Fig. 1). It contains only a few small stones, amongst which are two hard sandstones (Carboniferous) and a fragment of Cheviot porphyrite.

As this interesting section will probably disappear in the coming winter it is as well to have it recorded. I am indebted to Mr. B. Woollass for the photograph on page 301.

Morphology and Anthropology. By W. L. H. Duckworth, M.A. Cambridge University Press. 564 pages. 15s. net.

Though this is essentially a handbook for students, and unquestionably a perfect work of its kind, it also particularly appeals to the naturalist. By the aid of this book it is an easy matter, without any technical knowledge, to understand the principal features in connection with the natural history of man—a species far too frequently neglected by naturalists who may be fairly familiar with other members of the animal kingdom. It is perhaps difficult to select the chapters most likely to interest the readers of this journal, but those which appeal to the writer particularly are 'Human Embryology,' 'Comparative Craniology and Craniometry,' and 'Comparative Osteology.' In these chapters the respective subjects are dealt with with unusual clearness and precision. An important feature in the book is the great number of illustrations (over 330), which principally consist of the author's own sketches illustrating the points he describes.

Mr. Charles Bailey has favoured us with a reprint of his paper on '*Sisymbrium strictissimum* Linn., at Heaton Mersey, for the last fifteen years (1890-1904).'

POND VEGETATION.

NORMAN WALKER,

University of Leeds.

THE aquatic and marsh plant associations described in the following notes were examined in a group of ponds which are situated above the Bramhope railway tunnel, about half a mile south of Bramhope, near Leeds. They lie about 500 feet above sea level, and owe their origin to surface drainage into large shallow excavations made 66 years ago by the removal

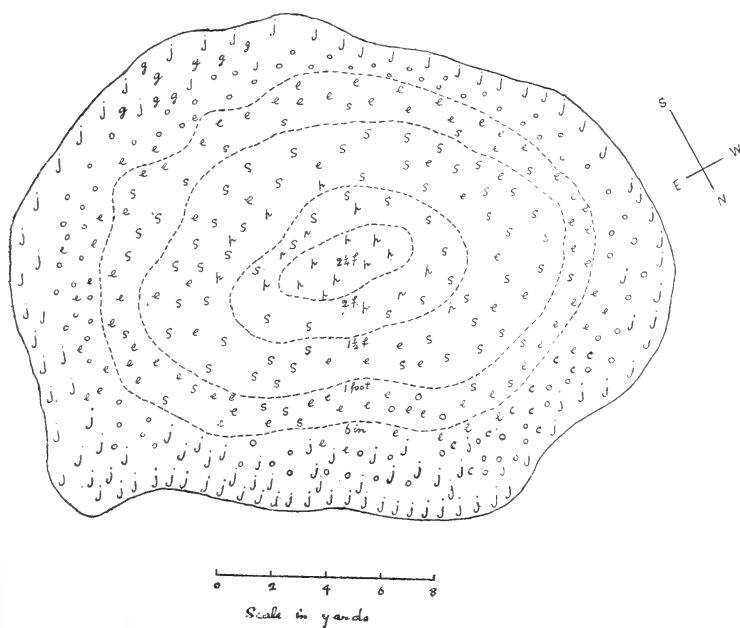


Fig. 1.—A shallow muddy pond showing vegetation zones. j=*Juncus communis*. o=*Eriophorum vaginatum*. e=*Eleocharis palustris*. s=*Sparganium angustifolium*. p=*Potamogeton natans*. c=*Carex vulgaris*. g=*Glyceria fluitans*. The dotted lines represent depth zones. The north bank is steep; the others slope gently to the water's edge. The diagram was made in the wet summer of 1904. During the dry summer of the present year (1905), the level of the water has sunk eight inches and the *Sparganium* extends across the entire pond.

of clay for the purposes of the tunnel building. The group is distributed over about a quarter of a square mile and includes eight ponds, varying in depth from one to four feet. The largest pond measures 210 × 78 feet and the smallest 54 × 41 feet. In none of the ponds is there either inlet or outlet.

FLOWERING PLANTS.

The principal factors which determine the distribution of the flowering plants are the character of the bottom of the pond and the depth.

The vegetation is richest in the shallower ponds with gently sloping muddy bottoms. Fig. 1 shows the distribution of the flowering plants in a pond of this type. The slope of the bottom is about one inch per foot and the depth of the mud about eight inches. The outermost zone of vegetation consists principally of *Juncus communis* Meyer; this extends inwards to a depth of six inches, but the plant thrives best upon the extreme edge of the pond, especially upon the steeper banks, where the rigid rhizome lies just below the surface of the soil.* A transverse section through the rhizome (Plate XIX., Fig. 1) shows a large cortex, consisting principally of a peripheral close parenchyma; within this is a narrow zone of aerating tissue†, containing irregular, radially-arranged air spaces. The central region is occupied by a large vascular cylinder, including numerous concentric vascular bundles embedded in a highly sclerenchymatous ground tissue. The feeble development of aerating tissue in the rhizome seems to be correlated with its existence near the surface where oxygen would be more plentiful than in the putrefying mud at the bottom of the pond; and its rigidity would allow of extension through the stiff soil. The roots are long and numerous, and, like the rhizome, contain a considerable amount of sclerenchyma. The cortex contains large radiating air passages (Plate XIX., Fig. 2) due to the collapse of many of the cortical cells; these allow of gaseous communication between the stem and the more deeply embedded parts of the plant.

Growing between the rushes at the edge of the pond are a few other moisture-loving plants. The commonest are *Galium palustre* L., *Myosotis lingulata* Lehm., *Ranunculus Flammula* L., and *Senecio aquaticus* Huds. Towards the middle of the rush zone and at a depth of three inches, Water Dropwort (*Oenanthe fistulosa* L.) begins. The slender stolons of this plant burrow in the soft mud and stop short when the stiffer soil is

* It is here only intended to touch upon the more obvious relations between the structure and environment of the flowering plants. It is hoped later to make dominant plants of each zone the subjects of separate papers.

† This term is used to designate the pronounced air-containing tissue, characteristic of water plants.

reached. The dearth of oxygen in the black putrefying mud at this depth renders necessary a well-developed intercellular space system which resembles that of an *Equisetum* stem. A transverse section of the underground stem shows a large central air canal, with smaller ones in the cortex equal in number to the vascular bundles. Fibres are sparingly developed and the stem is consequently weak; for this reason probably the plant is confined to very muddy ponds. At a depth of about nine inches the Dropwort merges gradually into a zone, consisting principally of *Sparganium ramosum* Huds. This is also a mud-loving plant, with a slender and somewhat weak rhizome, which lies only a little distance below the surface of the mud. The plant is, however, taller and more robust than the Dropwort and can exist in a greater depth of water. Attached to the base of the aerial shoots are numerous roots; these are of two kinds: long, stout roots which grow directly downwards and serve to attach the plant, and short, slender roots (water roots, Warming*), which spread out near the surface of the mud and are for water absorption. Scattered through the Bur-reed zone are numerous plants of *Eleocharis palustris* Br. The thin aerial stems of this plant offer but slight resistance to water movements and wind. Correlated with this is a shallow burrowing rhizome and short roots which can maintain the plant in shallower and looser mud than in the case of the Bur-reed. *Eleocharis* is present in all the shallow ponds at Bramhope, whether clayey or extremely muddy. The *Sparganium* zone ends at a depth of about eighteen inches and the *Eleocharis* six inches before this.

The thin underground stems of the Bur-reed offer a strong contrast to the stout rhizomes of many terrestrial Monocotyledons with large sword-shaped leaves, and take up comparatively little space in the muddy floor of the pond. This admits of invasion by other plants with narrow aerial shoots which occupy the gaps between the Bur-reed shoots. In the Bramhope ponds, as already noted, *Eleocharis palustris* invades the Bur-reed zone. In a number of ponds at Filey, Smith† found *Equisetum limosum* and *Alisma plantago* occurring with the Bur-reed (*Sparganium simplex*). In mill dams in the vicinity

* Eug. Warming, Botaniske Ekursioner. 3. Skarridsö. Vidensk. Meddel. fra den naturh. Foren. i Kbhun. 1897, p. 182.

† William G. Smith, 'Notes on the Vegetation of Ponds.' 'The Naturalist,' 1903, p. 389.

of Skarriðsö, Warming* found *Sparganium ramosum* in almost pure masses, the only invaders being solitary *Butomus* plants.

The central and deepest part of the pond is occupied by *Potamogeton natans* L., which at a depth of a little over two feet occurs alone. This is a very shallow rooting plant, and is not dependent upon a muddy bottom. It can fix itself equally well in clay, and, excepting *Juncus communis*, is the only plant found in all the Bramhope ponds. In the ponds containing little mud the Pondweed is almost without competitors, and occupies the shallow water as well as the deeper. In one clayey pond the *Potamogeton* is accompanied by large floating masses of *Juncus supinus* Mœnch. (Plate XIX., Fig. 5.) The fringe of vegetation around this pond consists of *Juncus communis*. At the margin the slope of the bottom is steep—about one foot in two—a condition which, in the Bramhope ponds, excludes *Ænanthe*, *Eleocharis*, and *Sparganium*. In the tall erect rush (*Juncus communis*), which is subject to a bending strain by wind, the vascular bundles and sclerenchyma are peripheral, and the weak aerating tissue is axial. (Plate XIX., Fig. 3.) In the floating *J. supinus* subjected to a pulling strain by water movements, the relative position of the aerating tissue and strengthening tissue is reversed. The pith, which is large in *J. communis*, and consists of stellate parenchyma, is considerably reduced in *J. supinus*, and is formed of close parenchyma. (Plate XIX., Fig. 4.) The cortex, which is small in *J. communis*, and includes a considerable amount of sclerenchyma, is large in *J. supinus*, and consists of a weak tissue with relatively large air spaces.

In the shallow, muddy pond (Fig. 1) the illumination of the lower region is considerably reduced by a crowded *Potamogeton* growth, and in warm weather, light is further absorbed by an abundant plankton (*Peridinium tabulatum* Ehr. and *Cyano-phyceæ*). The bottom flowering plant vegetation is therefore sparse, consisting only of a few dwarfed *Myriophyllum* plants. In deeper clayey ponds, *Potamogeton natans* is thinly scattered, and the plankton scarce; this admits of a more abundant bottom vegetation composed of *Potamogeton rufescens* Schrad.†

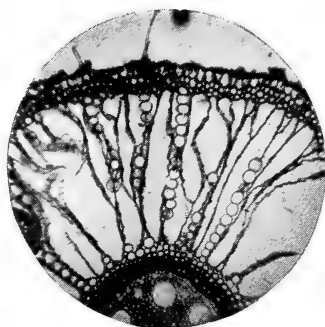
Upon the margin of one of the ponds wet clayey expanses occur; these sites, unsuited to perennation by marsh plants, are

* Ibid.

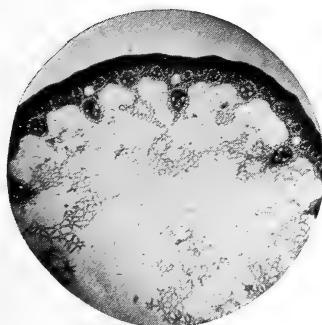
† Mr. Bennett, of Croydon, kindly confirmed the identification of this plant, and also *Juncus supinus* mentioned above.



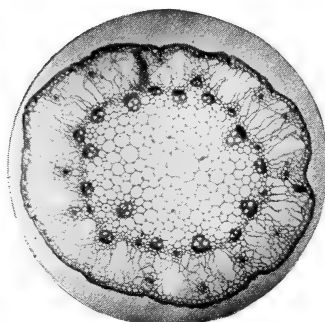
1.



2



3.



4.



5.

Fig. 1.—*Juncus communis*, rhizome, t.s. $\times 24$.

Fig. 2.—*Juncus communis*, root, t.s. $\times 70$.

Fig. 3.—*Juncus communis*, aerial stem, t.s. $\times 24$.

Fig. 4.—*Juncus supinus*, water stem, t.s. $\times 24$.

Fig. 5.—Rush Pond. *J. communis* and *J. supinus*.



Fig. 1.—Bur-reed and Rush Zones. The inner Bur-reed plants, growing with the *Potamogeton*, are rooted in two feet of water. In winter this is the site of a rich algal association (*Edogonium*) growing upon the old submerged parts of the Pondweed and Bur-reed.



Fig. 2.—Rush and Water Purslane Pond. The Water Purslane extends two feet inwards in the water and reaches a maximum depth of nine inches.

occupied by a shallow rooted annual, Water Purslane (*Peplis Portula* L.), Plate XX., Fig. 2. The annual decay of this plant slowly contributes towards the formation of mud, and thus would prepare the way for such mud-loving plants as *Sparganium* and *Ænanthe fistulosa*; these in their turn, as the muddy floor rises, would slowly encroach upon the pond, and ultimately, through their own incomplete decay and the obstruction by their shoots of twigs and other foreign matter blown against them, bring about its filling up and destruction. Several small ponds at Bramhope have already become almost obliterated, possibly in this way.

In another pond, with banks too steep for *Sparganium* and *Eleocharis* a mass of *Ranunculus aquatilis* L. occurs; this is very conspicuous in spring, but as summer advances it becomes obscured by a dense *Potamogeton* vegetation. *Glyceria fluitans* Br. occupies clayey places in some of the ponds, and where the water is muddy it has few competitors.

The well-known xerophilous characters, both of external aspect and internal structure, exhibited by many swamp plants (and plants of undrained ponds*) are conspicuous in the rushes, *Ænanthe fistulosa* and *Eleocharis palustris*. Schimper† points out that in the case of peat bogs, a condition of physiological dryness prevails, and, therefore, only xerophytes thrive in these situations. E. S. Clements‡ suggests that the xerophilous characters of amphibious plants are due, rather to the persistence of stable ancestral structures, than to the inhibition of absorption through the presence of humic acids§ and the bad aeration of the roots. This explanation is difficult of application in the case of the Water Dropwort, whose terrestrial ancestors probably resembled *Ænanthe crocata*. The submerged shoots of the Water Dropwort possess leaves with a flattened lamina resembling those of a typical umbelliferous plant. It seems probable that the xerophilous character of *Ænanthe fistulosa* is directly due to the root conditions, particularly bad aeration

* H. C. Cowles, 'The Physiographic Ecology of Chicago and Vicinity. Bot. Gaz., Vol. 31 (1901), p. 145.

† Schimper, A. F. W., 'Plant Geography upon a Physiological Basis.' Translated by W. R. Fisher, 1903, p. 8.

‡ Clements, F. E., 'Research Methods in Ecology,' p. 127. The original paper was not available.

§ Schimper. Ibid, p. 4.

and possibly the toxic effect of substances* contained in the mud.

The chief flowering plants occurring in the Bramhope ponds fall into two groups:—

I. Water Margin Association. (Included in Warming's Rohrsümpfe.†)

Plants rooted in mud and projecting a great part of their body above the water. Usually rigid, with well-developed xylem and aerating tissue. Roots numerous. Zonation in the following order:—1. *Juncus communis*. 2. *Peplis portula* and *Juncus articulatus*. 3. *Glyceria fluitans*. 4. *Ænanthe fistulosa*. 5. *Carex vulgaris*. 6. *Eleocharis palustris*. 7. *Sparganium ramosum*.

II. Aquatic Association. (Included in Warming's Limnäen-Vereinsklasse.‡)

Plants rooted in mud; completely submerged or with floating leaves; usually weak with well-developed aerating tissue. Roots few. *Potamogeton natans*, abundant in all the ponds. *P. rufescens*, occurring only in ponds with clear water and shallow mud. *Juncus supinus* occurs in clayey ponds.

ALGÆ.

The algal vegetation of the Bramhope ponds has been examined from time to time during the last two years and a number of well-defined groups or associations have been recognised. Although the distribution of these associations is

* B. E. Livingston. 'Physiological Properties of Bog Water.' Bot. Gaz., Vol. 39 (1905), p. 348. This observer cultivated *Stigeoclonium* (a green alga) in a number of different bog waters, and concludes from his results that 'there are chemical substances in at least some bog waters which affect *Stigeoclonium* as do poisoned solutions and solutions of high osmotic pressure.' The palmella condition of *Stigeoclonium* induced by cultivation in bog water is regarded by Livingston as a xerophilous character, as the plant passes into this form in drying media. In a previous paper (Bot. Gaz., Vol. 37, 1904, p. 383) Livingston showed that interference with absorption is not due to high osmotic pressure, as 'bog waters do not have an appreciably higher concentration of dissolved substances than do the streams and lakes of the same region,' and he further remarks that 'it is possible that the factor in bog water which prevents the growth of plants other than xerophilous ones may be the presence of unknown toxic bodies.'

† E. Warming, 'Lehrbuch d. ökologischen Pflanzengeographie.' German edition by Knoblauch, Berlin, 1896, p. 162.

‡ Ibid, p. 150.

controlled mainly by the temperature of the water, the flowering plant vegetation and the character of the bottom of the pond are not unimportant factors. The changes of temperature during the course of the year induce in the same pond a striking succession of associations. The following algal associations, named according to the dominant form, will be treated in detail in a subsequent paper :—

WINTER.—1. *Ædogonium*. 2. *Tribonema*.

SUMMER.—3. *Mougeotia*. 4. *Spirogyra*. 5. *Tolypothrix*.
6. *Anabæna*. 7. *Phormidium*. 8. *Microcystis*.



Nature Study: an Easy Key to the British Cruciferous Plants.* By William Ingham, B.A. (Lond.).

That an artificial key to the cruciferous species of plants should be labelled Nature Study seems to us somewhat inappropriate, to say the least; and whether Mr. Ingham's little school-book is really a desideratum for young nature students is very doubtful. It is certainly not necessary to the older botanist, who is already well supplied with fuller and more explicit keys in many standard works. Notwithstanding the good descriptions of the species and the explanations of the Latin and other terms—rather a matter for the word-student, however, than the nature student—we fear the whole will act as a deterrent rather than an inducement to the end in view. The question of determination of the leading natural orders of plants is not so difficult a matter; but it is far more important to the young student than the discovery of genus or species. The little brochure would set youthful scholars on to work that is always relegated to the expert. Let alone the extreme difficulty of defining 'species' and 'genus,' there is the fact that at least seven of the genera and about thirty of the British species are exceedingly uncommon plants. Our friend would make pupils of a tender age specialise with a vengeance, and that not on the highest form of botanical science.

Mr. Ingham describes in homely English terms when possible, and that is a good point; but that there is plenty of opportunity for extending the classical vocabulary one need only notice the nomenclature of the genera and species in his list.

Of the diagrams, which, of course, mean well, one cannot speak very highly in the matter of their accuracy or lucidity. Why should 'C' in Fig. 1 appear so like an inferior ovary rather than a cruciferous calyx of four sepals? Surely a good half side view of wallflower or cuckoo-flower would show the sepals distinctly. Fig. 2 is altogether misleading. Each pair of stamens (vide under 'B') should appear opposite and not in the same plane; and this could have been made clear enough in a half side view or semi-perspective elevation. The seeds on the replum in Fig. 3 are apparently fixed like those of no crucifer in existence. They should not appear opposite to, but alternate with one another. And why the siliqua in Fig. 26 should be inverted one cannot very well see. Cruciferous fruits rarely depend.

The last sentence in the book will, doubtless, evoke feelings of the mysterious, i.e., the germination of seed after the conflagration of a town, and the old fallacies of mummy wheat, charlock after long fallow or long rest from cultivation, white clover after 'liming' or marling, et hoc genus omne.

The price of the booklet, sixpence, seems to us quite plenty, when it is remembered that one can get the fullest keys to all the genera and species of British flora, together with the descriptions thereof, for a few shillings.

* A. Brown & Sons, Hull. 6d.

COLEOPTERA IN CUMBERLAND.

H. BRITTEN,

Penrith.

EARLY in January I took several specimens of the rare *Homalium gracilicorne* Fair. beneath the back of a fallen Scotch fir tree ; this insect is only recorded from two localities by Fowler in his 'British Coleoptera.'

During February *Phlæophilus edwardsi* Steph. turned up in some numbers. This insect I usually take on fine days during the winter months, sitting on the top of fence posts round a small plantation. A single example of the rare *Ptinus subpilosus* Müll. was taken beneath a fragment of bark on a sycamore tree ; I took two of these insects in a similar situation a few years ago.

During April I secured a pair of the very rare *Aleochara villosa* Man.; they were running on the walls in a stable. The plainly alutaceous head and thorax of this insect separates it at once from the common species.

Whilst turning over some stones on a gravel bed on the banks of the river Eden I took a number of *Homalota subtilissima* Kr., *H. pallens* Redt., and *Thinobius linearis* Kr., often finding the three species beneath the same stone ; the stones were deeply embedded in damp sand. This record corroborates Dr. Sharp's Scotch records, where he took the same three species in company.

A single specimen of *Miscodera arctica* Pk. occurred under a stone on Wan Fell, a portion of the Lazonby Fell range ; this is the third example of this insect taken by me in this locality.

During May *Pissodes pini* L. was found feeding on the bark of blown Scotch fir branches.

A nice specimen of *Enicmus brevicornis* Man. was taken beneath powdery fungi on an alder tree, and later in the month a pair of *E. testaceus* Steph. were found in a similar situation ; according to Fowler this is considerably further north than these insects have hitherto occurred.

Aleochara cuniculorum Kr. turned up freely in rabbit holes.

A single specimen of *Oxypoda tarda* Shp. occurred on a sand bed on the bank of the Eden ; this is the same spot where it occurred so freely in April 1904, when I first took this rare insect.

Scolytus destructor Ol. was found abundantly in the bark of a blown elm tree.

A nice colony of *Abdera flexuosa* Pk. was found in hard dry fungi on an alder tree.

I secured a small series of the rare *Donacia obscura* Gyll. and also a number of the beautiful *D. dentipes* F. in the Penrith district.

Where no locality is mentioned the insects have been taken in the Eden Valley near Great Salkeld.

COAL AND COAL MINING.

PROBABLY at no period in the history of this country has there been such an interest exhibited in coal and coal mining as at the present time, and it is pleasing to find that as a result of the recent Royal Commission on Coal Supplies there is no cause for anxiety as to whether there is a danger of exhausting that valuable mineral in this country.

Two exceedingly valuable volumes bearing on this subject have recently been issued from the offices of the 'Colliery Guardian' Company.* The first of these is the second series of the 'Annals of Coal Mining and the Coal Trade,' the first volume of which, published in 1898, contained a carefully prepared and interesting record of the use of coal from about 350 B.C. to the year 1835. In that volume, which is well illustrated by maps, diagrams, sections, etc., Mr. Galloway brings forward evidence to show that coal was probably in use in Roman times, particularly on the line of the Great Wall from the Tyne to the Solway Firth. (The recent researches of Mr. May in Warrington† would appear to confirm the views there expressed.) The author then comments upon the absence of authentic records relating to the use of coal in Britain during the dark ages; the well-known passage in the 'Anglo-Saxon Chronicle' probably referring to peat and not coal. After quoting some rather vague and ambiguous items supposed to refer to coal in the Norman period, Mr. Galloway takes up in earnest the history of the working and use of the mineral from about the year 1200 A.D., at which

* 'Annals of Coal Mining and the Coal Trade,' 2nd Series, by Robert L. Galloway. London. 409 pp.

† 'Digest of the Evidence Given before the Royal Commission on Coal Supplies.' Vol. I. 474 pp. Price 21s.

† 'Warrington's Roman Remains.' 1904. See 'Naturalist,' February 1905, p. 63.

period our modern coal trade may be said to have commenced. At that time the mineral first received a distinct name of its own and was called sea-coal in contradistinction to charcoal. In the middle ages apparently the mineral was principally used by smiths and lime-burners, and only to a limited extent for household purposes; coal smoke being exceedingly objectionable. To such an extent was this the case that in 1307 a Royal Commission was appointed to suppress the burning of coal in London except by smiths. The difficulties experienced in substituting coal for wood and charcoal; the introduction of railways and the invention of the steam engine; the difficulties of and dangers to the miners; the introduction of gas lighting and the general adoption of steam power are narrated in a scholarly manner, in this way bringing down the history of coal, etc., to 1835. In Mr. Galloway's second volume, just issued, the narrative is continued from that date to the passing of the Coal Mines Inspection Act in 1850. It is significant to note that whilst the history of coal mining from prehistoric times to 1835 occupied some 350 pages, the account of the industry during the following fifteen years occupies over 400 pages. During the period covered by this volume there was considerable activity in the coal and iron industries. Steam navigation became an accomplished fact, and numerous new collieries were opened out in the North of England and elsewhere. The career of these is very fully gone into, and the author pays particular attention to the causes and effects of explosions and other accidents in the various coal mines. Under this head the amount of material which has been gathered together is simply astonishing, and speaks well for the thoroughness of Mr. Galloway's work. To colliery owners and the thousands of others interested in the coal industry, Mr. Galloway's volumes are indispensable, whilst the geologist and antiquary will find much in them of value.

The other volume issued by the 'Colliery Guardian' Company is the first of three containing a digest of the evidence given before the Royal Commission on Coal Supplies. In this the publishers have unquestionably done a great service to all interested in the question. The labour of searching through the various details in the numerous blue books issued by the Commission is a very serious one, whilst the quantity of matter that has to be read, and the irritating way in which the questions and answers are printed, undoubtedly prevents many from deriving the utmost benefit from the reports. In the

Digest, however, the first volume of which has just been issued, the evidence has been made most readily accessible by the rearrangement and classification of the matter under separate heads, and by the conversion of the interrogative into a narrative form. The subjects covered by the first report of the Commission were supplemented in certain portions of the evidence given in the second and third reports. These have been inserted in the present volume in order to make it complete so far as the subjects treated are concerned. To insure accuracy the summaries printed in the Digest have been submitted to the witnesses, who have not only revised, but, where necessary, have amplified their evidence and illustrated it by diagrams specially drawn for this work. The general questions dealt with are 'The Working of Thin Seams,' 'Limit of Depth in Mining,' 'Waste in Working,' and 'Coal Cutting by Machinery.' It is unfortunate that the Reports of the Geological Sub-Committee were too late for inclusion in the volume, but they will probably appear in a future issue. The work throughout bears evidence of most careful editing, it is printed in clear type on excellent paper, and altogether is a creditable production. As a frontispiece there is a plate containing photographs of the various members of the Royal Commission.

A double number of 'Bird Notes and News,' the organ of the Royal Society for the Protection of Birds (3, Hanover Square, W.) appears for July, having special reference to the International Ornithological Congress. Its contents include a four-page supplement dealing with existing Bird Protection Legislation throughout the British Empire, and also an article on 'International Bird Protection,' pointing out the necessity for international agreement for the preservation, more particularly, of rare birds, plumage birds, and birds of passage.

The 'Annual Report and Transactions of the North Staffordshire Field Club' for 1904-5 contains an excellent portrait of the late Thos. Wm. Daltry, M.A., F.L.S., F.E.S.; a native of Hull. The Report also contains a catalogue of 'The Daltry Library,' founded in his memory in 1904. There are numerous papers and abstracts in the report likely to interest our readers, viz., 'Coleoptera occurring in North Staffordshire'; 'Notes on British Poisonous Plants'; 'Some Abdominal Ribs of *Hyperodapedon*, a Saurian, from the Keuper Sandstone at Hollington'; 'Fossil Fern from Butterton'; 'Additional Notes on a Section of Strata at Weston Sprink,' etc.

The 'Proceedings of the Manchester Field Club for 1900-1901' have recently been issued. The volume is a fairly substantial production and contains some most interesting information. Particular mention should be made of the admirably illustrated paper entitled 'Protective Resemblance in the Insecta,' by Mr. Mark L. Sykes. Of local value is the notice (with photo) of David Dyson, a former naturalist and a native of Oldham. Too much space, in proportion to the rest, appears to be devoted to general accounts of meetings and field excursions. We would suggest that these be considerably condensed in future, in order that this admirable publication may be brought more up-to-date. We should also like to see a greater proportion of papers relating to the natural history of the Manchester district.

FIELD NOTES.

BIRDS.

Ringed Plovers at Harrogate.—On 1st August two Ringed Plovers were picked up dead within the borough of Harrogate, and, curious to relate, they were found in places rather wide apart.—R. FORTUNE.

Late Breeding of Birds near Bradford, 1905.—On 14th July I came across a nest of six young Willow Wrens in Hirst Wood, a well-frequented spot, within two yards of the cart track. On 8th August a Wren was feeding young ones in the nest, about ten days old, in Shipley Glen. I watched this bird feeding for some time, as it was without a tail, and though I waited expecting to see its mate with the usual adornment, I was disappointed, for the only bird that entered the nest was the tailless one. On 6th August Sand Martins were still busy feeding their young in a nest on the banks of the Wharfe, at Ben Rhydding. 28th August: Song Thrush. On this date were some young ones, about ten days old, this being the third clutch hatched off in the same nest. Mr. Midgley has had the opportunity of watching and reporting on this occurrence, and has every reason to believe it is the same pair of birds. This nest is in a garden well sheltered and protected in every way.—W. H. PARKIN, Studholme, Shipley.

POND LIFE.

Pond Life at Stamford.—Supplementing Dr. George's report on the water mites [*'Naturalist,'* August 1905, p. 253] I am able, by the kind assistance of Mr. W. J. Wood, F.R.M.S., to give the following list of further organisms taken at Stamford, 29th June 1905:—

PROTOPHYTA.

Diatoma vulgare.
Diatoma elongatum.
Navicula cuspidata.
Cocconeis placentula.

DESMIDIÆ.

Micrasterias denticulata.
Closterium lunula.
Closterium didymotocum.
Penium digitus.
Cosmariium margaritiferum.

PROTOZOA.

Amæba vulgaris.
Amæba radiosa.
Arcella vulgaris.
Coleps hirtus.
Paramecium aurelia.
Vorticella nebulifera.
Euglena viridis.
Euglena longicauda.
Stylonichia mytilus.
Stylonichia pustulata.
Euplotes patella.

Euplotes charon.
Chilodon cucullus.
Cryptomonas ovata.
Loxophyllum meleagris.
Trachelius ovum.

ROTIFERA.

Pterodina elliptica.
Lepadella emarginata.

CLADOCERA.

Chydorus sphaericus.
Daphnia magna.
Daphnia vetula.
Cypris tristriata.
Cypris reptans.
Cyclops quadricornis.

Two specimens of *Hydra viridis* were also present in the sample of water taken, and several larger forms of pond life as *Corixa geoffroyi*, *Notonecta glauca*, and other insects in larvæ and complete stages.—ARTHUR SMITH, Grimsby.

◆◆◆

FLOWERING PLANTS.

***Rosa spinosissima* on the Yorkshire Wolds.**—The Rev. F. H. Woods, Rector of Bainton, who during the past summer has been making interesting observations on the East Yorkshire roses, sends us the first specimen of *Rosa spinosissima* that has been recorded from the Chalk Wolds. It was taken near Kilnwick. This is rather an unusual fact, inasmuch as the sand links and dunes of the coast seem to be the far more frequent habitats of this rose. It is, indeed, perhaps the commonest shrubby plant along the sandy parts of our north-east coast.—J. F. ROBINSON, Hull, 16th August 1905.

***Leonurus cardiaca* at Skipwith.**—On the occasion of the excursion of the Hull Scientific and Field Naturalists' Club to Skipwith Common, near Selby, on 12th August, Mr. Wm. Bromby obtained specimens of the Motherwort (*Leonurus Cardiaca*). This plant is an addition to the 'Flora of the East Riding.'—J. F. ROBINSON, Hull, 16th August 1905.

Lincolnshire Plants.—A long list of plants found at Scotton Common was the result of the meeting of the Lincolnshire Naturalists' Union on Friday, 28th July 1905, the best of which are:—

Hypericum elodes.
Radiola linoides.
Genista anglica.
Potentilla palustris.
Drosera rotundifolia.
Drosera intermedia.
Peplis Portula.
Cnicus pratensis.
Anagallis tenella.
Samolus Valerandi.
Gentiana Pneumonanthe.

Pinguicula vulgaris.
Scutellaria minor.
Littorella juncea
 (not seen for 30 years, but
 now in hundreds).
Narthecium Ossifragum.
Eleocharis multicaulis.
Eriophorum angustifolium.
Schœnus nigricans.
Sieglingia decumbens
Nardus stricta.

—E. A. WOODRUFFE PEACOCK, Cadney.

Nuphar lutea* var. b. *intermedia (Ledeb.)—vide Lond. Cat., 9th ed.—This plant, discovered early last century by the late Sir John Trevelyan, of Wallington Hall, Northumberland, still grows in the only British station, Chartner's Lough, on the moors to the south of the Simonside Hills, in the county above-mentioned. On the 8th August, accompanied by one of my sons, I visited the spot after a long walk over moors just becoming resplendent with the purple of heather, and found the Water Lily more plentiful and luxuriant than on two previous visits made at long intervals during the past twenty years. And I am pleased to think that there seems to be no danger of immediate extinction of *N. intermedia*. The long drought has not much diminished the water area in the midst of the peat-filled depression where it is situated, nor do Sphagnum and its allies and the more vigorous growth of *Carex ampullacea*, together with a few tufts of *Juncus conglomeratus*, appear to encroach upon the lough at a very rapid rate. On the other hand, the plants named seem to shelter the Water Lily, and possibly this is why it appears to have increased recently. Owing to the treacherous character of the peaty margin one had considerable difficulty in procuring specimens; but a few were obtained, all well fruited, and bearing the persistent petaloid calyces.—J. FRASER ROBINSON, Hull, 19th Aug. 1905.

***Cotyledon Umbilicus* (L.) (Navelwort) in Derbyshire.**—

As this curious plant is so rare in Derbyshire, it may be worth while to record that when visiting Froggatt Edge, Grindelford, with the Rucksack Club, on climbing bent, in December 1903, I saw a few young plants growing at the base of the rocks, not far from the Cave.—W. H. PEARSON, Manchester, 18th September 1905.

GEOLOGY.

Fish Remains in the Lower Chalk, North Lincolnshire.—

In visiting the well-known quarry near the Humber at South Ferriby recently I obtained the remains of a fish from the quarrymen. It had been taken from the marly bands in the uppermost beds of the Lower Chalk underlying the *Belemnitella plena* zone. The specimen is not complete and measures over twelve inches in length and the vertebræ are half an inch in diameter. On submitting the remains to Dr. A. Smith Woodward, F.R.S., that gentleman writes:—‘I have carefully compared them and am of opinion that they represent a new fish allied to *Thrissopater* of the Gault, and closely similar to my *T. magnus*

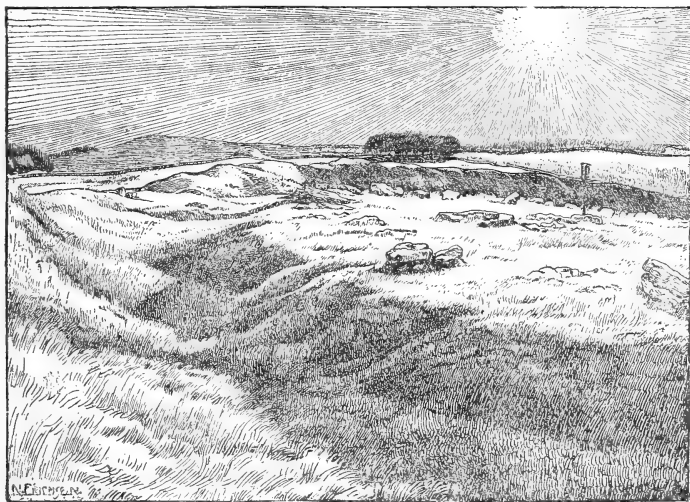
Naturalist,

from the Lower Chalk of Kent (Catal. Foss. Fishes, B.M., Part IV., p. 33, Pl. V.).' The specimen has been placed in the geological gallery at the Municipal Museum, Hull.—H. C. DRAKE, Hull.

REVIEWS AND BOOK NOTICES.

Highways and Byways in Derbyshire. By J. B. Firth. With illustrations by Nelly Erichsen. Macmillan & Co. London. 6s.

This, the latest of the 'Highways and Byways,' is in every way worthy of its position in this well-known series. The author tells much of interest relating to the county he so ably describes—though he deals largely with the less-frequented parts of Derbyshire. On perusing the pages one feels that it is by no means a 'hash-up' from the various guide books, but is largely the work of one who has seen and become familiar with the places he describes, and has added such information from literary and antiquarian sources as helps to add interest and value to his narrative. The book does not profess to deal with natural history, geology, science, and sport. We are told in the preface that there is nothing of the kind in the book, which



Arborlow, near Monyash.

is the chief misstatement we have found the author making. No naturalist can read through the pages without learning something. Mr. Firth gives a description of Arborlow, 'the principal prehistoric monument of Derbyshire, the Stonehenge of the Midlands, and almost as impressive.' It lies on high ground and commands distant views over a desolate land. It is a circular enclosure, 167 feet in diameter, surrounded by a ditch and vallum. In the centre are a number of large blocks of limestone, all of which lie on the ground in the form of a rude circle. From this site Thomas Bateman obtained several British burials and relics. We reproduce herewith, by permission, one of the numerous illustrations by Nelly Erichsen—by no means the best of her work. It can be safely said that her charming sketches very materially add to the value and beauty of this excellent volume.

NORTHERN NEWS.

A Seal was caught at Kilnsea, East Yorkshire, on 27th August.

'A fine female specimen' of Montagu's Harrier was shot by a gamekeeper on the moors of Coquetdale, in Northumberland, in August.

Mr. W. Johnson, one of the founders of the Lancashire and Cheshire Entomological Society, died at Wigan in August. He was in his ninetieth year.

Prof. E. Ray Lankester, Director of the Natural History Museum, South Kensington, has been elected President of the British Association for 1906, and will preside at the York Meeting.

The Rev. A. Thornley, M.A., F.L.S., has a paper on 'Nature Study, Actual and Ideal,' in 'The Parents' Review,' recently issued. It was read at the ninth annual conference of the Parents' National Educational Union.

At Thurlby, in South Lincolnshire, a boring has recently been put down for water, which was struck at a depth of 117 feet. The water, which rises 25 feet into the air by the pressure from below, flows at the rate of 170,000 gallons a day.

According to the 'Yorkshire Post' 'a gardener at Wakefield has discovered in his vinery at Wakefield a worm which is new to Yorkshire.' It has been determined as 'a land planarian (*Bipalium kervense*) which was first introduced to this country in the soil of foreign plants. . . . These animals increase by means of eggs, and by breaking pieces off themselves.'

We notice that the boatmen at Bridlington are complaining that in consequence of the shooting of sea birds not starting till the first of September there is not much to shoot—the result is that 'where they could earn a few shillings taking out shooting parties they are now barred.' If this is the only drawback naturalists will not be sorry—possibly the Bridlington boatmen will be able to earn the 'few shillings' in a better way.

Amongst the papers in the 'Annual Report and Transactions of the Manchester Microscopical Society for 1904,' just issued, are the following: 'Micro-organisms associated with Disease,' by Prof. S. J. Hickson; 'Way-side Plants,' by W. H. Pepworth; 'Notes on the Radiolaria,' by Rev. T. Robinson; 'The Micro-Flora and Fauna of our wells and surface troughs,' by J. E. Lord; 'Further Notes on Arboreal Insects,' by A. T. Gillanders; and 'The Microscope as an aid to the Identification of Poisons,' by C. Turner.

Mr. Walter Garstang's presidential address to the Norfolk and Norwich Naturalists' Society, entitled 'The Natural History of the North Sea,' appears in that Society's 'Transactions' (Vol. 8, Part 1) just issued. Mr. T. Southwell, F.Z.S., also writes 'On Migration other than of Birds, with special reference to the cetacea.' Of particular interest to our Lincolnshire readers is a paper in the same volume by Mr. Arthur Bennett, on the 'Distribution of *Sonchus palustris* L. and *Atriplex pedunculata* L. in England.' Arthur Young saw the *Sonchus* in the East Fen when staying with Sir Joseph Banks at Revesby Abbey in 1799. It now seems to be quite extinct in the county.

The North Eastern Railway Company appear to lose no opportunity of drawing attention to the many charming districts which are served by its lines. Towards this end a number of lantern lectures have been prepared, and may be obtained, together with the illustrative lantern slides, from the Chief Passenger Agent's office at York. The lectures deal with the (a) Yorkshire coast, (b) Tynedale and Northumberland coast, (c) Teesdale and Lake district, (d) Wharfedale, Nidderdale, and Wensleydale, (e) York, Rievaulx, Richmond, Swaledale, and Durham. The accompanying letter-press has been written by Rev. John Quine. The lantern slides are from photographs, and will be found most useful to Natural History Societies, etc.

3 OCT. 1905

Naturalist,

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NOTES AND COMMENTS.

MALTON NATURALISTS.

We have just received the 'Twenty-first Report of the Malton Field Naturalists' and Scientific Society for the years 1900-1904.* It contains a list of the lectures delivered during that period, as well as the balance-sheets, from which latter it would appear that, notwithstanding the small membership, the society is well able to pay its way, and leave a very substantial balance in the hands of its treasurer. There are abstracts of lectures and a 'presidential address,' which, from its nature and subject, we could easily identify a well-known Wetwang worthy as its author, though this is not stated. Attention is drawn in the report to the crowded state of the society's Museum, respecting which Dr. Smith Woodward wrote:—'Among the local Museums of recent foundation, it would be difficult to find one of more scientific interest and importance.' We should like to see the valuable collections of local geological specimens and antiquities in this Museum preserved in a suitable public building at Malton, and maintained at the public expense.

CLEVELAND NATURALISTS.

The 'Proceedings of the Cleveland Naturalists' Field Club, 1903-4, Vol. 2, Part 1,† are also to hand. As a frontispiece is a photograph of the late Rev. J. Hawell—a genuine 'guide, philosopher, and friend' to the Cleveland Club, which is followed by a lengthy and appreciative memoir. The society and its editor are to be congratulated upon the local character and value of the papers printed. In addition to the item already referred to are the following:—'History of Easby,' by the late Rev. J. Hawell; 'Crossbill in Cleveland' and 'Buzzards on the North East Coast,' by F. R. Atkinson; 'Excursion to Redcar Rocks,' by H. Simpson; 'Black Rat at Middlesbrough' and 'Cleveland Lepidoptera in 1903-4,' by T. A. Lofthouse; 'Monumental Brasses of Cleveland,' by T. M. Fallow; 'Gravel Deposit in Lonsdale,' by F. Elgee; 'Cleveland Coleoptera,' by M. L. Thompson; 'Meteorological Record,' by C. L. Bell, as well as the Secretary's report and 'In Memoriam' notices of the late Robert George Clayton and Angus Macpherson. There are, however, far too many misprints, and we do not welcome the change in the colour of the cover.

* 30 pp. Price 6d.

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BLEA WYKE BEDS.

The paper by Mr. R. H. Rastall in the recent issue of the 'Quarterly Journal of the Geological Society,' entitled 'The Blea Wyke Beds and the Dogger in North-East Yorkshire,' clearly proves that there is still much good work to be done in the Geological field, even in those areas which have been frequently worked by geologists. Notwithstanding the frequency with which the geological features of North-East Yorkshire have

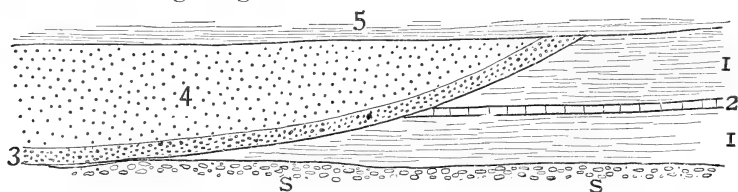


Fig. I.—Contemporaneous Erosion of the Lias, East Cliff, Whitby.

- 5—Shales of the Estuarine Series.
4—False-bedded Sandstone.
3—Ferruginous conglomerate.

- 2—Ironstone-band.
1—Upper Lias (Alum-Shale).
S, S—Shingle of beach.

been examined and described by most able workers, Mr. Rastall has been able to add to our knowledge of this interesting area. At the outset he has tackled the question of the exact stratigraphical position of the Blea Wyke beds and their relations to the beds above and below them. To him they have also yielded much interesting information on the history of the Peak fault. Mr. Rastall finds that a perfectly complete transition from the Lias to the lower Estuarine series is only seen at Blea Wyke; elsewhere the sections show some signs of unconformity, in most cases clearly shown by a well-marked basal pebble bed.

THE PEAK FAULT.

Mr. Rastall has many other interesting observations in his notes, particularly in reference to the Peak fault; but having drawn attention to it, we must leave our readers to peruse the paper for themselves. It is illustrated by two drawings of

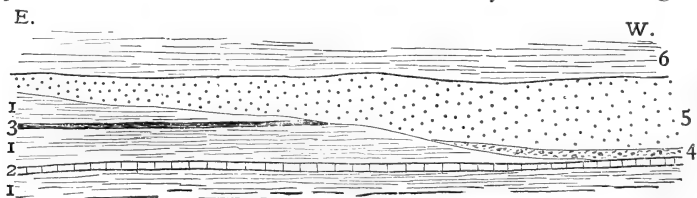


Fig. II.—Boulby Alum Works, Eastern Quarry.

- 6—Shale of the Estuarine Series.
5—Sandstone of the Estuarine Series.
4—Conglomerate.

- 3—Impure Coal.
2—Ironstone.
1, 1, 1—Alum-Shale.

sections which we are enabled to reproduce by the permission of the Geological Society. The first gives a diagrammatic representation of the contemporaneous erosion of the Lias at East Cliff, Whitby. Fig. II. shows a section at the Boulby Alum Works, where it is evident that at the eastern end of the section the sandstone rests upon an eroded surface of Lias ; the Dogger is apparently represented only by the basalt conglomerate at the western end, and is absent towards the east.

EARLY SEED-BEARING PLANTS.

The Manchester Literary and Philosophical Society continues to publish most valuable memoirs dealing with the various branches of science and natural history in which its members

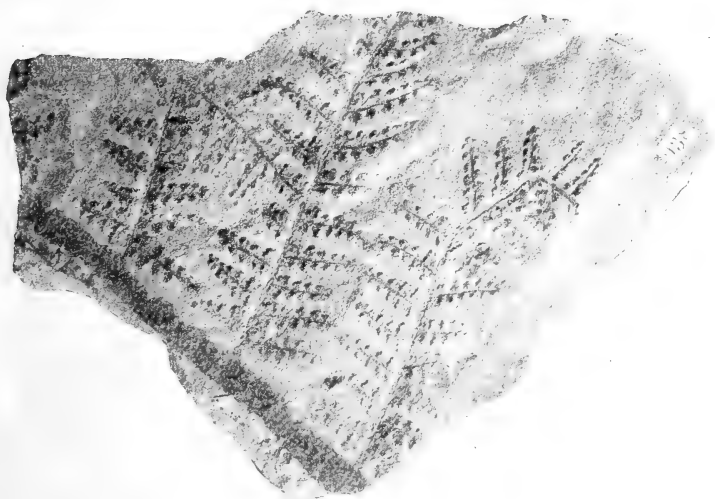


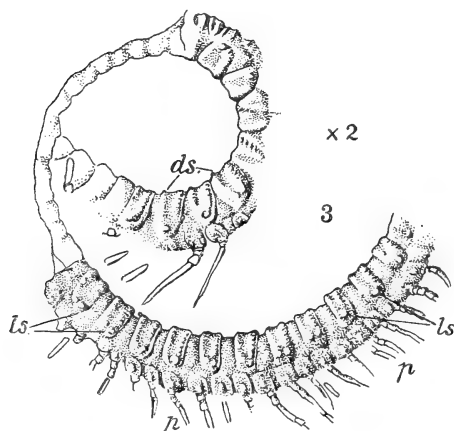
Fig. 1.—*Sphenopteris Höninghausi*.

are interested. Before us is one of these, entitled 'The Early History of Seed-bearing Plants as Recorded in the Carboniferous Flora,' this being the Wilde Lecture delivered by Dr. D. H. Scott, F.R.S. In this Dr. Scott carefully reviews the evidence bearing upon the question, and pays a well-deserved tribute to French Palæo-Botanists for their share in this interesting study. 'It is one of the great triumphs of the French School of Fossil Botany (although we may not accept their results in detail) to have first grasped the fertile idea that nearly-related plants may

lie, some on one side, some on the other, of the ideal Crypto-gamic-Phanerogamic boundary. The demonstration that something like a debatable land once lay on this frontier, now so well delimited, is perhaps the greatest contribution which Palæobotany has yet made to the Theory of Descent.' As is the general case with Dr. Scott's papers, this is well illustrated, and we are permitted by the society to reproduce herewith one of the figures. It is a photograph of *Sphenopteris Höninghausi*, the foliage of *Lyginodendron*, a fragment of the highly compound frond showing spiny rachis with pinnæ, pinnules, and small incurved leaflets.

A COAL MEASURE MYRIOPOD.

In the October 'Geological Magazine' the Editor, Dr. Henry Woodward, F.R.S., describes some Crustaceans and two Myriopods from the Lower Coal-Measures near Colne, Lancashire. 'All the specimens are enclosed in small elliptical nodules



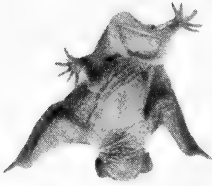
Euphoberia Brownii. Enlarged twice natural size.

ds, dorsal surface; *ls*, bases of spines; *pp*, walking-feet.

of clay-ironstone evidently formed around the organisms by a process of concretionary action at the time of their embedment in the sediment forming the layer in which the nodules occur, the fossils being, as usual in such cases, exposed by splitting the concretions open along their periphery.'

The specimen which we are kindly per-

mitted to figure herewith is from Mr. Peter Whalley's collection. It is from the soap-stone bed at Carre Heys, Colne. In the nodule is a coiled up myriopod having indications of a head, and about thirty equal-sized segments, each composed of a saddle-shaped plate rounded at its lower edge. Dr. Woodward also figures and describes other interesting forms from this productive zone in the coal-measures. His notes are prefaced by a description of the Geological horizon, etc., of the soap-stone bed, by Mr. Herbert Bolton.



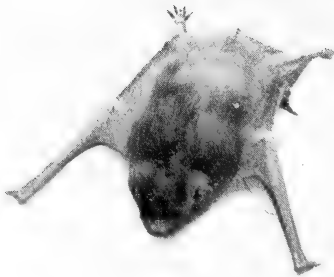
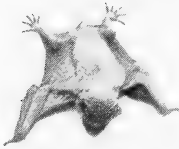
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Fig. 1.



AC

Fig. 2.



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Fig. 3.

BATS.



AC

Fig. 4.

NOTES ON THE BREEDING HABITS OF BATS.

ARTHUR WHITAKER,
Worsborough Bridge, Barnsley.

CONSIDERING the large number of persons who nowadays interest themselves in some branch of natural history, it is very strange that so little attention should be paid to those interesting little creatures, the Bats, and that so little should be known about their distribution, longevity, breeding habits, etc.

It is seven years since my friend Mr. Armitage and I commenced carefully observing the Bats occurring in the Barnsley district, and a most interesting study we have found it. Here we have taken seven of the eight species recorded for Yorkshire, and some notes on their relative abundance and habits were printed by Mr. Armitage in 'The Naturalist' for February 1905.

So little being known of the breeding habits of British Bats, it has for many years been our hope to rear some in captivity, a thing which, I believe, has not hitherto been done. Our efforts have at last been partially successful, and except for an unlucky accident many interesting points relating to the life history of these creatures might have been solved.

The following notes have already been made, but I sincerely hope that we may be able to supplement these with a more complete account in the future.

During the last week of July 1901, when attempting to catch a Pipistrelle Bat (*Vesperugo pipistrellus*) in my butterfly net at dusk, I accidentally struck it with the ring of the net and killed it. The specimen proved to be a female, containing a single, fully-developed young one, which would have been born within a few days had the mother lived.

During the latter part of May of the present year I observed a number of Pipistrelle Bats flying about over a small pond at Worsbrough Bridge on several consecutive evenings, and from the manner in which they were chasing one another about concluded that pairing was then taking place. Accordingly I made several visits to the pond with my butterfly net in order to catch some alive, and endeavour to obtain the young in confinement if possible. On the evening of the 27th of May I netted one female, on the following night two females and one male, on the 30th one of each sex, and on the 31st one female, and also a Whiskered Bat (*Vespertilio mystacinus*).

The five female and two male pipistrelles I placed altogether in a large cage, feeding them every afternoon, when I usually

gave them about ten mealworms each. For a week or two I found it necessary to give them this food from my fingers, and water to drink from a camel's hair brush. Later they learnt to feed themselves if the water and mealworms were put into the cage.

I did not expect these pipistrelles to pair in captivity, nor did I ever see anything to make me think that they were at all likely to do so. Unfortunately I concluded when the end of June came without showing any result that my experiment was a failure, and the two males and two of the females were removed and sent away for preservation; nor have I, I am sorry to say, the exact date when this was done. Of the remaining three females two escaped on the 15th of July, whilst I and my friend Mr. Wakefield (to whose kindness I am indebted for the photographs illustrating this article) were endeavouring to get a snapshot of them 'feeding' out of doors.

The only other female had died the previous day, and upon examination it was found to contain a small embryo, probably not more than half developed. We were much astonished to discover this, and I had apparently concluded too soon that I was not going to obtain young. Had more careful note of dates and observations been made, some light might have been obtained as to the period of gestation, which, I am inclined to think, is exceptionally long for the size of the creature.

On 28th June of the present year, Mr. Armitage and I were informed of a colony of Bats which had just taken up their residence in the hole of a beech tree at Stainbrough, from which we had taken seven male Noctules (*Vesperugo noctula*) during the summer of 1904. On the 29th we visited the tree in question, arriving at dusk, and only just succeeded in getting a butterfly net over the hole as the Bats, which were then squeaking loudly, began to emerge. Mr. Broadhead, the woodman, who had informed us of the Bats, and through whose kindness we have obtained many examples at various times, informed us that he had counted 24 as they left the hole at dusk the previous evening. This was about the number that we estimate came into the net on the 29th, but unfortunately they managed to tear a hole in the net, and a number escaped, so that we only secured twelve individuals, all Noctules, eleven males and one female. After all the Bats had apparently come out of the hole, I put in my arm and felt round the top, and there I discovered a young one hanging on the roof (see Plate XXII., Fig. 1 and 2). It was blind and naked, and we concluded at the time that it

was only a day or two old. Later observation leads me to think that it was between ten days and a fortnight old. It was impossible to select the female Bat from the others at the time, as all had been placed together in a canvas bag, and were very lively (it is no joke risking one's hands in a bag of living Noctules, that is, if one has at all 'sensitive feelings'). The baby was accordingly carried home separately, and not placed with the female bat until next day, when the photograph (No. 3 on Plate XXII.) was taken of the pair. The adult Bat would have nothing whatever to do with the young one, however, and attempted to bite it once or twice when I put it near her.

The reason for this was shown about 5.30 in the afternoon of the 30th of June, the day following its capture. I had just given the female Bat a drink of water from a brush, and tried without success to get it to eat, when I noticed that it seemed restless and irritable. I accordingly gave up trying to feed it, when it crawled up the angle of its cage, which was perforated zinc all round and had a lifting lid at the top, the lid being off at the time. When it got to the top it clung across the corner, head down with one foot on each side of the box, hanging across the angle. In this position it gave birth to a young one, and I much regretted that I had no camera handy at the time, as a splendid photograph or two might easily have been obtained whilst the Bat was in this position. As soon as ever the head of the baby Bat protruded it commenced to squeak lustily. The young one was quite free in about four minutes' time, and worked its way under the shoulder of its mother, and so round on to her back, where it clung quite exposed, head downwards. There was no after-birth, and the mother seemed little worse for the ordeal she had gone through, but busied herself with washing and brushing her fur all over for a long time afterwards, taking no notice of 'baby,' who kept on squeaking shrilly all the while. The note of the young Noctule is a single chirrup even more highly pitched than the note of the adult. It is so penetrating that when only but a few days old I could hear the young Bat calling after I had gone to bed at night, though it was in a cage downstairs, and in a room not directly under my bedroom.

Being doubtful whether the Noctule could rear both her own and the foster child, I removed the latter rather than run the risk of losing both. The morning after the birth of the young one I found the mother had deserted it, and it was hanging downwards on the cage side some little distance from her. This

occurred repeatedly during the first two days. I kept gently pushing the young one under her mother, but in a short time she would leave it again, and I attribute this to the fact that she had now been without food for nearly three days. On the evening of the third day after her capture, when the young one was over 48 hours old, both appeared so weak and felt so cold that I decided that it was a case of making the mother eat or of losing both. Accordingly I took her out of the cage, and holding her by the skin at the back of the neck shoved a mealworm into her mouth. As soon as she felt something between her teeth she bit savagely at it, and mealworms being an irresistible delicacy to Bats, no sooner had she tasted it than she kept on biting until she had eaten it. I then gave her a second, then a third, and so on until she had actually consumed the enormous number of eight dozen, and so eager did she get that if another mealworm was not forthcoming the instant she had finished one, she would run excitedly round and round on the table and bite at anything within reach. After this enormous meal she had a good drink, and then when I put her back in the cage and gave the young one to her I was delighted to see her take to it at once. She first seized it quite roughly in her mouth, and taking no notice of its vigorous squeaking and struggling proceeded to give it a good wash and brush, much after the style of a Cat washing its kitten. She then tucked it away under the skin between the shoulder and thigh, pushing it so far round that it appeared only as a protuberance on her back (see Plate XXII., Fig. 4). This I found later was the invariable method of carrying the young one, who was packed away like this, head downwards, all along, and suckled from this position by merely stretching its neck a little. For the first week my Noctule always kept the young one tucked under her right wing, as far as I saw, and I believe it suckled from that side only. Later it put it under either wing indifferently.

After the third day I had no further trouble over feeding the mother whilst I kept her. I had only to open the cage door at any time of night or day, and chirrup to her, and she would prick up her ears and come shuffling quickly down the side and across the floor and on to my hand, and there take as many mealworms as I would give her. She was particularly tame, especially for a Noctule, and never once tried to bite me, though I often held her on my hand whilst feeding her. Usually she would bring the young one with her, in which case the young one clung to her with its teeth and was dragged along under

her, trying to walk, with its hind feet projecting from under its mother and close to hers, so that she seemed to have four back feet, all working out of time. The effect was decidedly comical. In spite of this the 'baby' did not seem to hamper its mother's movements very much when she was crawling. When disengaged from its mother the young one would cling with extraordinary tenacity to the gauze side of its cage, or to a handkerchief on which we once or twice photographed it, and great care was necessary to remove it without injury from anything of which it had got a firm hold.

One night I allowed the mother, who had brought her youngster out to supper, to try to fly with it, but she hesitated a long while before making the attempt, and when she did so only flew the length of the room, and then dropped rather heavily upon the floor, the young one remaining under her right wing all the time.

The mother consumed an average of about seven dozen mealworms per day, that is about a quarter of an ounce of food. Besides this I gave her sundry moths and a few caterpillars and pupæ, which seemed equally welcome. One day I put a fine Poplar Hawk Moth in the cage alive. She caught it and ate it instantly.

On 11th July, when the young one was eleven days old, I examined it, and found that it was still blind and naked, and apparently about in the same condition as the first youngster was when we found it in the tree; from this it would appear that growth is slow.

On the evening of that day the adult Bat managed to tear a hole through the gauze of its cage and escape from the house through the open door, leaving the young one behind it in the cage. I saw it flying about over the garden at about ten o'clock, and several times it flew close to the house front, and hovered once in front of the door. Unfortunately the young one was not calling at the time, or I feel sure it would have returned to it.

As I was most anxious to get it back if possible, I put the cage containing the young one in the garden, with the door slightly open, and sat up all night watching it. The youngster got cold and restless, and commenced to call loudly at about eleven o'clock, and kept it up incessantly after that. My eyes were getting rather heavy, and about two a.m. I walked through the house into the kitchen, and washed my face with cold water to refresh myself before returning to my vigil. I had been

watching a minute or so after my return when it struck me that the young one was no longer calling, and upon getting up and going to the cage I found it empty. Moreover, the young Bat was certainly nowhere in the vicinity, as I never heard it call again, although I sat up until daybreak, listening and looking for signs of it. Whether the mother succeeded in 'spiriting' it right away during the few moments of my absence, or not, I cannot say.

I was exceedingly sorry to lose both the Bats in this way just when I was beginning to feel confident that I should rear the youngster successfully.

On 1st July 1905, Mr. Armitage and I again visited the tree from which we had taken the twelve adult and one baby male, and the single female, on the night of 29th June, to ascertain if those which had escaped us had returned to the same hole. On this second visit we found ten Noctules in the hole, one of which again escaped, whilst the nine we caught and examined proved to be all males. Thus as the result of our investigation of a 'breeding colony' of Noctules we have to record 21 adult males, two young males, one adult female, and one which escaped us, but which was presumably a second female and the mother of the young one first found.

On the face of it there seems to be a remarkable disparity in numbers between the two sexes.

Mr. Armitage and I have handled over 27 Noctules previous to this, taken at different times and places, without ever getting a single female. Further information and statistics on this point would be interesting, and I hope that these notes may be the means of arousing more interest in these creatures. If more field naturalists would take up the study much fresh information would soon be forthcoming as to their habits, distribution, etc.

ENTOMOLOGY.

The Yorkshire Specimen of *Eubolia mæniata*.—It is advisable to place on record that the specimen of *Eubolia mæniata*, taken near York by the late Mr. William Prest (see 'List of Yorkshire Lepidoptera,' p. 61), which I believe since the death of Mr. Prest has remained in the collection of the late Dr. Philip B. Mason, of Burton-on-Trent, has now, on the death of Dr. Mason, passed into the collection of Mr. Eustace R. Banks, of Corfe Castle.—GEO. T. PORRITT, Huddersfield, 6th October 1905.

THE RECORDING OF LOCALITIES.

ALFRED HARKER, M.A., F.R.S.

IN the September number of 'The Naturalist' (p. 260) Mr. Cosmo Johns, after urging the necessity of accurate topographic records of scientific observations, propounds for this purpose a plan which doubtless has its merits. The following is an alternative method, which experience shows to be well adapted to geological work in particular.

To ensure accuracy, all records should be made *on the spot*, and the map must therefore be carried in the field. The usual method of map-mounting is not convenient for outdoor work, and it is better to use loose slips. These are carried in a small leather-covered portfolio, slung by a strap over the shoulder, the slips being held in place by elastic bands. The standard six-inch Ordnance maps are published in sheets measuring 36 by 24 inches, exclusive of margin, with separate numbering for each county.* Cut off the margin of the sheet, and cut it into four quarters, 18 by 12 inches, to be distinguished as N.W., N.E., S.W., and S.E. Cut each quarter again along a vertical line into two slips, measuring 9 by 12 inches. These are to be distinguished as $\frac{N.W.}{W.}$, $\frac{N.W.}{E.}$, etc., and so marked on the back. Now fold each slip along a horizontal line. By cutting and folding the whole sheet is thus divided into sixteen quarter-quarter sheets, each 9 by 6 inches. They may be distinguished as $\frac{N.W.}{N.W.}$, $\frac{N.W.}{N.E.}$, etc.; and a special advantage is that they correspond with the separate sheets of the 'twenty-five-inch' map. The folded slips fit into a portfolio measuring a trifle more than 9 by 6 inches, and may be sorted to place the slip in use on the top of the pack.

The index-letters applied to the sixteen divisions of the sheet may now be used for purposes of reference. They are, of course, to supplement, not to replace, the ordinary description of the locality, and so serve for finding the place rather than for fixing it. The actual entry in a record of observations or catalogue of specimens would thus be in some such form as the following:—

Quarry 620 yards E of church, Burnsall : York-
shire, 134 $\frac{S.E.}{S.W.}$

* For certain parts of the country there is an issue in quarter-sheets, 18 by 12 inches, and it is apparently to these that Mr. Johns refers.

If more precise localisation is desired, as is often the case in geological work, the only satisfactory plan is a permanent record on the map itself, either the working copy or an uncut duplicate kept at home. This can be effected without defacing the map. Prick in the locality with the point of a pin; then *on the back* of the map draw a small circle round the pin-hole, and write within it the catalogue number or other convenient reference to the note-book in which the observation is fully recorded. If the entries are not crowded, somewhat more information may be set down on the back of the map.

The division of the map into slips, as here advocated, is that in use on the Geological Survey. The pin-prick device, which I have found very convenient, was given to me, I believe, by my friend Professor Watts.

LEPIDOPTERA.

***Chariclea umbra* at Barton-on-Humber.**—It may be interesting to record that I took a slightly crippled specimen of *Chariclea umbra* at sugar here on the 21st June last. I have found sugar very attractive this summer to common things, moths swarming on the patches night after night.—G. W. MASON, Barton-on-Humber.

FLOWERING PLANTS.

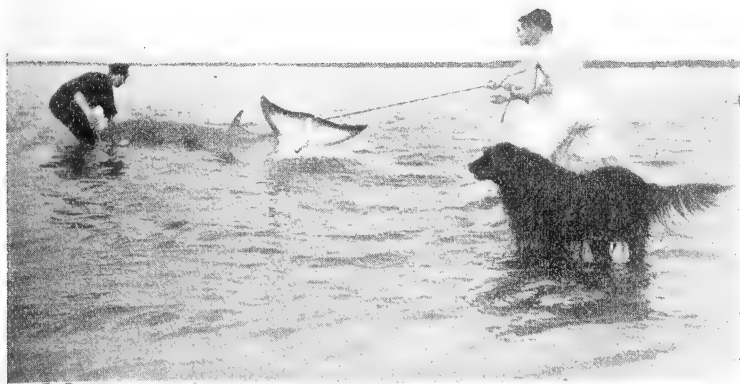
Plants Enlarging their Area.—It is just as well to put on record the spreading of species which up to date have had more or less confined distribution. When I returned to Lincolnshire in 1891 *Diplotaxis muralis* was only a railway ballast casual, almost unrecognised. It is not in Mr. F. A. Lees' 1891-2 list in White's 'Lincolnshire.' Now it is found on every railway in the county, and has practically got into every place where sidings run, as coal yards, quarries, etc. During the last two years it has become a fairly conspicuous village weed in places not far from railways, as for instance, Howsham and Scunthorpe. It may be found on broken ground by the roadsides, in garden ground, or in thin herbage by footpath sides. *Erysimum cheiranthoides* was first recorded by Rev. J. Britten in his list of 1872 in White's 'Lincolnshire.' When I returned in 1891 it was confined to the arable peaty soils. It is now frequently found on the same broken ground as *Diplotaxis muralis*, but from its greater size prefers garden ground. Both species have appeared in my own little garden.—E. ADRIAN WOODRUFFE-PEACOCK, Cadney, Brigg, 7th September 1905.

A WHALE-HUNT IN YORKSHIRE.

R. S. AUDAS, M.R.C.V.S.

THE opportunity of enjoying the excitement of a whale-hunt does not offer itself to everyone, and as the experience of capturing and killing a two-ton Rorqual over twenty feet long is, to say the least, uncommon, a brief description may be interesting.

The writer of this short account, with a friend and two brothers, was camping on a sandy promontory on the East Coast of Yorkshire, which formed a barrier some miles long



protecting an estuary and enclosing a large area of sand and mudflats, the latter being covered at high water to an average depth of from six to eight feet.

Late in the afternoon of August 15th, over the flats and about the top of the tide, something unusual was observed in the distance about half a mile away from the shore, and on seeing a column of water arise from the object, it was unanimously decided to be a whale. Being familiar with the various depths of water, the position of the object clearly indicated that, if it could be driven a little south, where a hook of sand could hamper its movements, it would reach shoal water, and if kept

there until the tide fell, could be easily secured. This course was decided upon. To undress was only the work of a moment. The best swimmers of the party, three in number, entered the water armed only with a short rope. After a long swim they reached the dark object which was then still upon the surface, and the most venturesome of the party managed to slip a noose over the flukes of the tail. The tightening of this noose was the signal for a move on the part of the whale, fortunately in the right direction, and not sufficiently violent to necessitate leaving go. A few more attempts to rid itself of the incumbrance (each becoming more violent and displaying temper) carried the party into water where the bottom could be reached. A pull could now be got on the line, and so the whale kept practically under control until the spit of sand beneath shallowed and the animal grounded. Finding itself a prisoner, the whale lashed the water with great violence, and considerable care had to be exercised at this period. Its huge mouth was opened once, displaying a fringe of white baleen and a palate as white as snow.

Several attempts were then made to mount its back, its movements all the time resembling those of a bucking horse. Then a return to the tent was made for a heavy camping axe, and this proved an effective weapon. At the fourth blow the brain was reached. A violent leap, a few savage strokes with the tail, and the huge mass lay quiescent, the sea as suddenly reddening for many yards with blood and oil.

Although the members of the party had worked hard for three and a half hours in a chilly sea, they did not leave the carcase until the jaw-bones had been secured as trophies, and this brought an exciting and unique experience to a close.

GALLS.

Hymenopterous and Dipterous Galls at Huddersfield. —

A search for galls early in October resulted in the following Hymenopterous species being recorded from Ellen Springs, near Shepley, viz., *Nematus gallicola*, *Andricus fecundatrix*, *Spathogaster baccarum*, *Neuroterus lenticularis* Oliv., *N. fumipennis* Htg., *N. numismatis* Mayr., *Dryophanta scutellaris* Adler (= *folii* Mayr.), *Biorhiza renum* Girand., and *Cynips kollari*; also the Dipterous gall *Hermomyia peligera* from the Beech trees in Mollicar Wood, Farnley, and Mag Wood, Honley.—
W. E. L. WATTAM, Newsome.

THE HIGH TIDES ON THE EAST COAST.

W. H. WHEELER, C.E.,

Boston.

THE equinoctial tides this autumn were exceptionally high on the east coast and combined with a strong north-easterly gale did very great damage to the cliffs between Bridlington and the Humber.

It is considered that there has not been such a rough tide on the coast for 20 years. At Withernsea the waves were described as 'rising to an enormous height, the whole of the beach being flooded with roaring surges, massive rollers thundering shoreward, lashing themselves into seething foam, and dashing up to the sea wall broke over the promenade.' Large quantities of the cliff were eroded by the waves in this neighbourhood, and the beach denuded of sand and shingle to a depth of 15 feet. At Kilnsea the sea broke through the bank on the east side and flooded the land behind, doing much damage. All along the Holderness coast there were great falls of boulder-clay from the cliffs.

The tides for the 30th September and 1st October are given in the Admiralty Tables as the largest of the year, and were calculated to rise 22 feet 10 inches above L.W.S.T. in the Humber at Hull, or 14 feet above Ordnance Datum and 1.60 feet above an ordinary spring tide.

New moon was on the 28th and was in Perigree, or at her nearest point to the earth, on the 29th, and had $11^{\circ} 21'$ south declination. The wind over the North Sea was blowing strongly from N.N.E. with force 6 at Spurn Point on the 30th, and from N.W., force 7, on the 1st October. The circumstances were therefore all in favour of a large tide.

High Water in the Humber at Hull above Ordnance Datum was as follows:—

Saturday, September 30th	a.m.	Feet. 15.07
Do. do.	p.m.	14.67
Sunday, October 1st	a.m.	13.51
Do. do.	p.m.	13.07

High Water morning tide on the 30th being:—

At Grimsby	...	...	...	Feet. 14.50
,, Ferriby Sluice	...	...	...	17.39
,, Goole	...	...	...	17.25
,, Naburn Lock	...	...	...	16.66
,, Owston Ferry	...	...	...	17.16
,, Boston	...	...	...	17.30
,, Lynn	...	...	...	17.63

The highest previous tide in the Humber, at Hull, of which there is any record, was in March 1883, when high water reached 15'91 feet above Ordnance Datum.

The æger ran up the Trent with considerable force, passing Gainsborough with a crest of 4 to 4½ feet high followed by five or six other waves—the breaking wave running along the banks with a height of five to six feet. After the bore passed the water rose 4 feet in as many minutes.

In the Ouse also there was a strong æger passing Goole with a crest 2 feet high, and at Selby 3 feet, the wave there breaking completely over some keels lying aground in the river.

The Hull Museum and Education. Fourteenth Quarterly Record of Additions. By Thomas Sheppard, F.G.S. Being Nos. 26 and 27 of the Hull Museum Publications.

'Good stuff lies in little room' is an adage exemplified in these two pamphlets. Into their 46 pages a goodly mass of instructive and withal easily assimilable information has been compressed. The first of these gives a concise history of the museum from its inception in 1822 to the present time, and enlarges upon the educational lines on which it is now conducted. To most of the author's strictures on the aimless and diversified nature of the collections in most provincial museums we should be disposed to assent. Here and there they seem unduly severe, e.g., those of Llewellyn Jewitt, quoted with seeming approval from the 'Art Journal.' The evolution of boots and walking sticks may be equally as scientific a study as the evolution of weapons of offence and defence, to the case illustrating which Mr. Sheppard deservedly draws attention; and it does not detract from their interest and value to know that Queen Elizabeth used one and a prominent actor in the Civil War another.

Special attention is drawn to the fact that the main feature of the museum is that its contents are almost entirely of a local character. Notwithstanding this we were amused, but not surprised to find from the second of these pamphlets that the sight of a Roman brooch, found near Doncaster and exposed for sale in that town, proved irresistible to Mr. Sheppard, who promptly secured it for his, not the, local museum. Exceptions of this kind are the natural outcome of that boundless enthusiasm and ready knowledge possessed by Mr. Sheppard, of which the final portion of the first pamphlet is a sample. Here we find how much really solid education a museum may disseminate amongst young and old when an energetic and capable man is at its head.

For some time past five mornings each week have been devoted to the delivery of lectures to scholars. A list of the lectures, numbering 21, is given. These are well-ordered, progressive, and wide in their scope, ranging from the early history of the earth and the various changes it has undergone and is undergoing, to the economic arts of coining and pottery. That they have been productive of much good cannot be questioned. It has been the writer's good fortune to be present at one of these morning lectures, and the sight of a large class of boys, orderly and well-behaved, eagerly attentive to Mr. Sheppard's every word, was a sight not soon to be forgotten.

To the discerning mind a pamphlet of this kind, combining as it does theory with practice, is a real inspiration. What Hull has done and is doing other towns can do; perhaps not quite so well, for curators of the stamp of Mr. Sheppard are not to be found readily. We fancy no one will be more disappointed than the writer himself if his pamphlet fails to stimulate natural history societies in other towns to be up and doing.—E. G. B.

Naturalist.



Fungus Foray. The Workshop, Matby.

FUNGUS FORAY AT MALTBY.

C. CROSSLAND, F.L.S.,
Halifax.

THIS year the Mycological Committee held its annual Foray at the ancient and picturesque village of Maltby. The meeting was of five days' duration—23rd to 28th September—the headquarters being at the White Swan Hotel. The village is charmingly situated on a slight hill-slope facing south, on the Rotherham, Tickhill, and Bawtry road, $6\frac{1}{2}$ miles from Rotherham, the nearest railway station. It is in close proximity to the venerable ruins of the Cistercian Monastery, Roche Abbey, founded by the lords of Maltby and Hooton some five or six centuries ago. The district is well wooded, and lies within the Trent tributary area on the southern confines of the county, bordering on Nottinghamshire. The soil is clay and loam on a foundation of Magnesian Limestone. The altitude ranges from about 150 feet at Woolthwaite Bottom, 200 feet at Roche Abbey, to 350 feet at the highest part of Maltby Wood.

The areas investigated lie to the N.E., E., and S.E. of Maltby, and include Maltby Wood, which covers about a square mile, Sandbeck Park, the woods near Firbeck Hall, King's Wood, Stubbings Wood, and the rich grounds surrounding Roche Abbey. Mr. Sheppard had obtained permission from the Earl of Scarborough and from Mr. S. Jebb, J.P., of Firbeck Hall, to visit their extensive estates. On Saturday, the 23rd, a party of ten met at the Rotherham G.C. station and proceeded by wagonette to Maltby. These included Messrs. Alfred Clarke, Huddersfield; Thos. Gibbs, Wirksworth; James Needham, Hebden Bridge; J. H. Holland, Kew; C. H. Broadhead, Thongsbridge; R. H. Philip, Hull; J. H. Johnson, Dewsbury; R. Gilchrist, Scarborough; J. Ackroyd, Heckmondwike; and the Secretary of the Mycological Committee. Others who steered their own course to the hotel at various times during the week were R. F. Jones, Malton; Thos. Smith, Alderley Edge, near Manchester; A. Robertshaw, Luddendenfoot; F. A. Mason, Leeds; and Messrs. Oliphant and Peck, of Rotherham. Mr. Massee was unable to attend, and Messrs. H. Wager and N. Cheesman were with the British Association in South Africa.

Mr. Ambler, Lord Scarborough's agent, met us at headquarters and pointed out, by aid of the 6-in. Ordnance Maps, extensive ranges of woodland and pasture over which we were free to roam, only a small game preserve being excepted.

Saturday afternoon was given to the investigation of a butterbur bed, a few pastures, and a narrow strip of woodland along the banks of Maltby Dike. This short run out gave promise of abundant material for the following week, over 60 species being picked up, including several uncommon ones. A peep into a small plantation behind the village, belonging to Maltby Hall, discovered some very fine specimens of *A. campestris* var. *villaticus*. On the following day the southern portion of Maltby Wood and the Far Common was looked over, resulting in the finding, among numerous other things, of the following uncommon species:—*Lycoperdon echinatum*, *Lepiota acutesquamosa*, *Pleurotus pantoleucus*, *Entoloma sinuatum*, *Agaricus hæmorrhoidarius*, *Paxillus paradoxus*, *P. panuoides*, *Lactarius cilicioides*, *L. fuliginosus*, a typical specimen of *Boletus satanas*, and several species of *Cortinarii*.

In a birch wood with a bracken undergrowth, the fly agaric—*Amanita muscaria*—was seen in quantity, making a gorgeous display with their bright-scarlet, white-studded caps, and white-frilled collars, among the green grass and the bronze bracken stalks.

The programme of excursions was not strictly adhered to, it being found advantageous to vary it. On the Monday a few went to Maltby Wood, others to Roche Abbey Valley and to King's Wood. The latter place was found to be rather dry, yet a few things were collected among the dead larch-leaves not seen anywhere else; these included *Hypholoma capnoides*, *Boletus laricinus*, and *B. viscidus*. Among the numerous species found in the Abbey Valley, on this and a revisit on the Wednesday, were *Tricholoma immundum*, *T. murinaceum*, *T. album*, *Clitocybe aggregata*, *Eccilia atropuncta*, *Stropharia coronilla*, *Hygrophorus olivaceoalbus*, *Lactarius aspidius*, *Russula lutea*, *Panus torulosus*, five or six Corti's, and *Clavaria abietina* in abundance.

We found the upper part of Maltby Wood scarcely a typical place for 'heaps' of fungi, it being void of damp, rotting, moss-covered branches, and more of the dog mercury type; lower down, bracken monopolises the undergrowth, yet by carefully searching those and other more favourable portions of the wood, we obtained a number of uncommon species. Among some hazel bushes a *Lycoperdon* was found, unknown to any of those present, which appeared upon examination to be probably *Lycoperdon velatum* Vitt., a species which is believed to be new to Great Britain. Specimens have been submitted to Mr. Massee for verification, together with a few other critical species.

Others were *Lepiota acutesquamosa*, *L. parvanulata*, *L. seminuda*, *L. Bucknalli*, *Tricholoma sejunctum*, *T. spermaticum*, *T. leucocephalum*, *Clitocybe inversa*, *Collybia aquosa*, *C. ocellata*, *C. rancida*, *Mycena amicta*, *M. clavicularis*, *Inocybe echinata*, *Marasmius lagopinus* (first found in this country at Helmsley at the 1903 Foray), *Boletus piperatus*, and several *Cortinari*. One of the features of this wood was the abundance of *Entoloma nidorosum*. Another, the quantity of the deep crimson *Hygrophorus puniceus* among moss, dead twigs, etc., under hazel bushes, four or five hundred yards away from a pasture. This is a pasture species, and we were surprised to meet with it under such conditions; the colour was quite as vivid grown in the shade, as ever we have seen it in the open fields; one cannot safely dogmatise in limiting a plant absolutely to any particular habitat or association. Oak and birch are the commonest trees with a sprinkling of ash and sycamore. In some of the quarters hazel is common. There are also many ancient yew trees, upon one of which *Paxillus panuoides* had gained a foothold in a humus-lined crevice. The woods generally are rich in fine old yews, many, judging by their enormous, rugged trunks, having faced their five or six hundred winters, perhaps more.

While at work on Tuesday in the upper part of Maltby Wood, a good old native who expressed rather antiquated notions on the Creation of all things, including the date, warned us that if we took home 'them toadstools' we should all be poisoned. It seemed quite a relief to him to learn seriously that we were not gathering them especially to eat, still he failed to understand why we were gathering them at all, if not for that purpose. He was gathering blackberries. The old man is not by any means alone in his belated ideas as to the principal object of promiscuously gathering toadstools and other fungi. A gradual awakening, however, is coming about. By all means let edible fungi be gathered for the 'pot' if the gatherer knows the right kind; it prevents a waste of tasty food.

Among the things brought in by the Firbeck and Stubbings Wood party were *Lepiota hispida*, *Tricholoma inamænum*, *Mycena juncicola*, *Pholiota spectabilis*, *Hypholoma cotoneum* Quel., from which Dr. Cooke's pl. 543 in Illustr. might have been figured (see Yorks. F. Flo., p. 103), *H. incomptum*, *Hygrophorus spadiceus*, *Russula chloroides*, *R. puellaris*, *Lentinus cochleatus*, *Dædalea confragosa*, *Fistulina hepatica*, and many *Cortinari*.

In Sandbeck Park there are some fine old beeches bordering an avenue leading from the entrance to the residence. The

district generally is well wooded, and the trees comparatively free from disease. Only one ash was seen to be affected with *Polyporus hispidus*, and that in the garden corner of Maltby Rectory; we were allowed to take the specimen for an exhibit. One yew in Roche Abbey Valley was attacked by *Polyporus sulphureus*, and a couple of oaks near Firbeck with *Fistulina hepatica*—the beef-steak fungus—from one of which a chunk three or four pounds in weight was taken. *Fomes annosus* was about among the firs, but sparingly. The birches in Maltby and other woods, so far as we noticed, are free from the attack of the deadly *Polyporus betulinus*. We had evidence, though, that this disease is in the district. While walking along the road we noticed a post-and-wire field fence in which two segments of a diseased birch trunk did duty as posts, with the disease still upon them. We found the fungus still growing and producing millions of spores capable of affecting healthy trees if they found their way to a weak spot. Perhaps the farmer thought the posts were ornamented with the fungus brackets, and so they were, only, this is not the way to check disease but to spread it.

The potato disease—*Phytophthora infestans*—was prevalent and causing much loss to the farmers.

In perusing the foregoing portion of the report it will have been observed that species of the genus *Cortinari* were met with at all the places visited; they have been much more abundant at this than at any previous Yorkshire Foray with the exception of Helmsley. As a rule they are late comers in the fungus world. Possibly the forward and favourable season has coaxed them out two or three weeks earlier, and perhaps in greater numbers than usual, the bulk generally appearing in October. A similar phenomenon is reported from other parts of England. The following were determined:—*C. (Phleg.) scaurus*, *C. (Phleg.) decoloratus*, *C. (Myx.) elatior*, *C. (Ino.) alboviolaceus*, *C. (Ino.) callisteus*, *C. (Ino.) arenatus*, *C. (Derm.) ochroleucus*, *C. (Derm.) camurus*, *C. (Derm.) lepidopus*, *C. (Tela.) laniger*, *C. (Tela.) impennis*, *C. (Tela.) hinnuleus*, *C. (Tela.) helvelloides*, *C. (Tela.) injucundus*, *C. (Tela.) paleaceus*, *C. (Hygr.) bicolor*, *C. (Hygr.) uraceus*, *C. (Hygr.) leucopus* (very plentiful), *C. (Hygr.) erythrinus*, *C. (Hygr.) acutus*.

Hygrophorus chrysodon was fairly common in most of the woods, nor was *H. glutinifer* rare.

(To be continued.)



Greenstone Chippings.

NEOLITHIC REMAINS ON THE DURHAM COAST.

C. T. TRECHMANN, B.Sc.,

Castle Eden.

IN 'The Naturalist' for March 1904 I described and figured a few implements which had been found on the coast a few miles north of Hartlepool. Searching further to the north has resulted in the finding of a well-defined working site. It is situated immediately above the shore-line, on the edge of a ravine about 300 yards to the north-east of the new railway station at Horden.

The site has been well chosen ; it consists of a large tract of clay and drift, partly covered towards the south by a layer of sand. It is protected on the side facing the sea by low sand-banks, which in some parts form a barrier ; on the north by the ravine above mentioned, and on the west by a smaller ravine adjoining the larger one. Both were probably sources of fresh water.

The ground slopes gently to the west. The part upon which most of the implements were found consists of about two acres of exposed clayey soil, which, for some reason, has been almost completely bared of vegetation. Possibly the whole was originally covered with sand, which has been removed since the trees surrounding the ravine were cut down. At any rate, the surface has been, and is still being, considerably denuded. The rainwash is plainly evident, and the water runs down towards the west, forming furrows in the clay.

To the south are some ploughed fields, very similar to those at the Black Halls, which have yielded several flakes and other remains.

Among the implements picked up on the site are some arrow-heads, including half-a-dozen remarkably symmetrical and two defective examples, this being the only place on the Durham coast where I have succeeded in finding this class of implement.

The series of scrapers found is characteristic of the district, and there are no very symmetrical specimens amongst them ; in several cases they are formed from a flake which has been struck off the outside of a flint pebble.

About 500 flakes were picked up, all of small size, scarcely any being above two inches in length. Apparently the flakes were all struck from pebbles found in the clay and on the shore. Large flakes such as are found so plentifully in districts where

the chalk occurs were entirely absent. The flakes range in colour from white and pink to red and yellow, and vary from being translucent to quite opaque. Many when burnt or weathered have a mottled appearance.

The surface of the ground is here strewn with small rounded flint nodules, possibly carefully collected from the shore and streams in the neighbourhood and kept in readiness to be worked up into flakes and implements. Several of the larger of these nodules are battered and bruised round the edges, the minute facets of freshly broken flint having weathered and assumed a milky appearance. Most of the 'hammer-stones,' however, were merely rounded quartzite pebbles.

Cores, generally the nuclei of the small flint nodules above-mentioned, also occurred. None of them show very many facets.

Although several hundred chipped flints were collected it was not found possible to fit any of the flakes together or to their parent cores; however, I think that the presence of such a quantity of very small and even microscopic chippings of flint, together with the battered hammer-stones, is sufficient evidence to show that the implements were actually made on the spot.

A few perforated pebbles of flint and limestone were found, which may possibly have been employed as net-sinkers. Such naturally perforated pebbles are often picked up on the shore now and sometimes kept as 'lucky stones.'

In addition to all these implements about a hundred rough weathered chips of greenstone were picked up. On looking at the series closely, it is evident that many of them have been roughly chipped to pointed or cutting forms.* As these rough greenstone implements do not appear to have been noticed elsewhere, and, so far as these coasts are concerned, are confined to this one site, I have had some of them photographed (Plate XXV.).†

* One is undoubtedly a chipping from a polished greenstone axe.—ED.

† A few fragments of pottery were picked up on the bare ground, the only undoubtedly ancient pieces being about six fragments of Roman mortaria, consisting of part of a rim and four or five pieces of the body of the vessel, the insides of which are studded with hard grains, which have been shown to be composed of slightly fused ironstone. Several fragments of a peculiar cinder-like substance, apparently the slightly fused ironstone for grinding up and studding in the mortaria, were noticed. Amongst the rest of the pottery are about three fragments, which have every appearance of being parts of the rims of vessels of ordinary Roman black ware; and a few pieces of very rough hand-made pottery, in which the clay has been largely mixed with fragments of quartz before burning.

(*To be continued.*)

MR. HAROLD WAGER'S ADDRESS.

THE Presidential Address to the Botanical Section of the British Association was delivered at Johannesburg, and dealt with some problems of cell structure and physiology. In the course of his remarks the President (Mr. H. Wager, F.R.S.) pointed out that the discovery that all living organisms are composed of microscopic vital units, called cells, in which the living substance—the protoplasm—resides, had paved the way to a clearer understanding of the complicated processes which are at work in the growth and reproduction both of plants and animals. The structure of the cell has a definite relation to its physiological activities. The essential constituent of a cell is the protoplasm. This is differentiated into a semi-fluid substance known as the cytoplasm and a central denser substance known as the nucleus. The structure of the nucleus is extremely complicated; it exists in the form of a granular network, and contains a substance, characterised chemically by the presence of phosphorus, which represents probably the highest point in the development of living matter. The nucleus is the centre of activity in the cell and governs all its vital functions. In the processes of growth and reproduction it gives rise to a number of deeply stainable structures—the chromosomes—which are the carriers of the hereditary tendencies of the organism and are therefore intimately bound up with the phenomena of heredity and variation. It has been suggested that an organism may be regarded as a colony of independent units (cells) by the co-operation of which it exists as an individual, but this is not correct. The cell cannot be regarded as an independent unity working merely in association with other cells; the various functions performed by it are no doubt dependent upon its own activity, but the exercise of these functions is governed by the organism as a whole, and in none of the higher plant or animals can the cell have an independent existence.

Many attempts have been made to show that the apparently formless, semi-viscid cytoplasm possesses, like the nucleus, a definite structure related to the various functions which it performs. The most noted of these is the hypothesis put forward by Butschli that the cytoplasm has a foam structure. This hypothesis and others is discussed in the address, and the general conclusion is arrived at that it is more in accordance with the facts we know regarding the cytoplasm that it should be considered as a homogeneous semi-fluid substance, in which

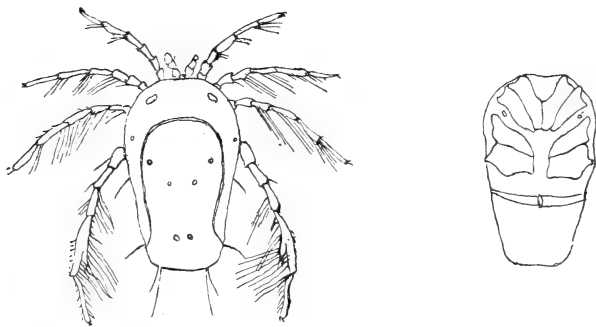
granules, vacuoles, foam structures, fibrils, etc., can be produced as secondary structures by its own activity.

The structure and function of other cell organs are dealt with, including the chlorophyll corpuscles, eye-spots, starch-formers, centrosomes, etc., and among other interesting topics discussed are experimental observations on the activities of the nucleus, the differentiation of structure visible in the living cell, the cell-structure of the blue-green algæ and bacteria, the function of the nucleus in the blue-green algæ, and some observations on the evolution of the nucleus.

LINCOLNSHIRE FRESHWATER MITES.

C. F. GEORGE, M.R.C.S.

Arrhenurus truncatellus Müller. This mite belongs to Sig. Thor's division Truncaturus. It was first described by Müller in his work on 'Danish Freshwater Mites,' published in 1781, under the name of *Hydrachna truncatella*. He also gives

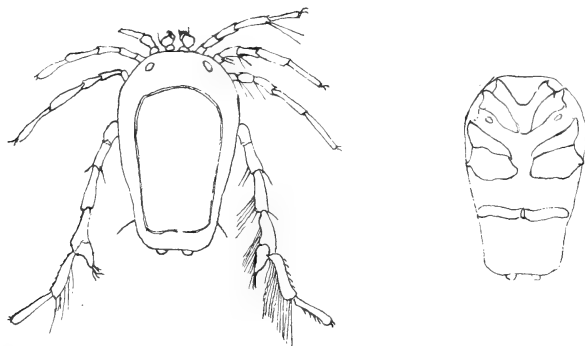


Figs. 1 and 2.—*Arrhenurus truncatellus truncatellus* Müller—Piersig.

a coloured figure, 'Tab. VII., Fig. 6.' It does not appear to be very common in Lincolnshire, as I found a single specimen in May of the present year. It will be remembered, perhaps, that in my list of Water Mites, published in 'The Naturalist' for August 1900, I mention *Arrhenurus truncatellus*, and refer to a figure of it in 'Science Gossip' for April 1884, page 210. The mite there figured and described, however, is not the mite described by Müller, as Dr. Piersig pointed out to me, but differs chiefly in having two convex bladder-like projections at

Naturalist.

the posterior end. He therefore considers it to be a variety of *truncatellus*, and in das 'Tierreich' he names it *Arrhenurus truncatellus georgei* Piersig, reserving the name *Arrhenurus truncatellus truncatellus* Müller for the type specimen. It is well to point out that Koch in his work on 'Dutch Water Mites' 1835, describes a mite which he calls *A. truncatellus* Müller, and considers to be *Trombidium truncatulum* of Fabricius.



Figs. 3 and 4.—*Arrhenurus truncatellus georgei* Piersig.

He also gives a coloured figure, differing very considerably from that of Müller, and which appears to have two convex projections at the posterior end, and is, I think, probably *A. truncatellus georgei* of Piersig. Anyway, it appears that both mites occur in Lincolnshire. I am indebted to Mr. Soar for the figures which were drawn from my specimens.

LEPIDOPTERA.

***Eupithecia pimpinellata* in North Lincolnshire.**—So long ago as the 15th September 1897 I took by the sweep-net some larvæ of the genus *Eupithecia*. From them I bred several moths, which, for a long time, I was unable to get identified; but finally, Mr. E. R. Bankes kindly named them for me as *Eupithecia pimpinellata*. The larvæ were taken in a disused chalk pit about three-quarters of a mile out of Barton. This year I searched and swept the Burnet Saxifrage in the same pit, and in other localities near the Humber, in vain for the larvæ. Not having worked for them since 1897, it is possible that they have removed to other quarters. The species is an addition to the Lincolnshire List of Lepidoptera.—G. W. MASON, Barton-on-Humber.

MUSEUM CURATORS AT BOLTON.

By the invitation of the curator of the Bolton Museum, a conference was held at Bolton, on Saturday, 30th September. Representatives attended from the following museums:—Manchester, Keighley, St. Helens, Bury, Rochdale, Huddersfield, Warrington, Halifax, York, Stockport, Liverpool, Bolton, Oldham, Cawthorne, Sheffield, and Hull.

The principal point of interest was the Hall-i'th-Wood Museum, a 15th century building, which has been purchased, equipped, and presented to the inhabitants of Bolton by W. H. Lever, Esq. This visit was most instructive. The museum is



Hall-i'th-Wood Museum (*from an old print*).

entirely occupied by furniture and other antiquities, relating, as near as possible, to Bolton, and its famous son, Samuel Crompton, who invented the spinning mule in the building. A striking feature was the manner in which the place had been restored, and the attractive way in which the exhibits were shown. It was particularly agreeable to notice that even the exhibition cases containing the smaller specimens were principally contemporary cupboards and other old pieces of furniture. The large size of the building enabled the various objects to be

Naturalist,

exhibited without crowding in any way, thus rendering their appearance very pleasing indeed. Of particular value was the collection of photographs and water-colour drawings of old parts of the town which are disappearing, or have disappeared.

A visit was next paid to the Chadwick Museum of Geology, Natural History, etc., which contains many interesting specimens. There was evidence on all sides of activity, and specially noticeable were the efforts being made in connection with teaching the young. The Mayor kindly provided tea at the Town Hall, after which the Chairman of the Museum Committee (Alderman J. T. Brooks) gave an address on the history of the three museums at Bolton, two of which had been visited that afternoon. Subsequently the following papers were read and discussed:—‘The Missing Link between the Home and the Art Gallery,’ by Mr. S. C. Horsfall; ‘The Relation of Museums and Art Galleries to Schools of Art and Technical Schools,’ by Mr. F. Griffin; ‘The Exhibition of Fresh Wild Flowers in Museums,’ by Mr. G. A. Dunlop; and ‘The Use of Mirrors for Exhibiting Coins, Medals, and other Objects,’ by Mr. Entwistle. The afternoon proved most pleasant and profitable. We are indebted to Mr. W. W. Midgeley, the curator, for the loan of the block accompanying these notes, the illustration being taken from a capital little guide to the Hall-i-th-Wood Museum, which was distributed amongst the visitors.

Bird Life Glimpses. By **Edmund Selous.** George Allen. 6s. net.

Still they come, and Mr. Selous has been able to select a title for another book on birds which is probably different from that of any previously printed bird book. The author, during a three years' stay at Icklingham, in Suffolk, has evidently kept very careful observations upon the birds in his district, and these he places before us in a book of over three hundred closely-printed pages. Some of them are very interesting indeed. Parts of the book, however, are rather ‘wordy’ and indicate that the author is able to write better at some times than at others. Mr. Selous evidently wishes to impress us with the fact that he is a scholar, judging from the frequent quotations and expressions which he makes in various languages. These, however, become irritating. There are eighteen illustrations by E. G. Lodge, all of which are excellent.

The Waveney Valley in the Stone Age. By **W. A. Dutt.** 41 pp. and 4 plates. (To be obtained from the author at 438, London Road, Kirkley, Lowestoft.)

In this interesting little pamphlet Mr. Dutt presents in readable form a general account of the various stone implements which have been found in the district, as well as of the deposits in which they occur. His summary of our knowledge of the Palæolithic implements and the famous Hoxne beds is very useful. That part of the pamphlet dealing with the Neolithic Period is arranged under the heads of the various parishes in the district, details of the finds in each being given. There are three plates of implements, but the types represented are not particularly rare, nor are the specimens exceptionally fine.

FIELD NOTES.

GEOLOGY.

Large Mammoth Tooth at Withernsea.—A very fine tooth of a mammoth was recently found on the beach at Withernsea by a young lady. It is one of the lower jaw teeth and weighs $9\frac{1}{2}$ lbs. Judging from its excellent condition, it had only recently been washed from the clay. It is now in the Hull Museum.—T. S.

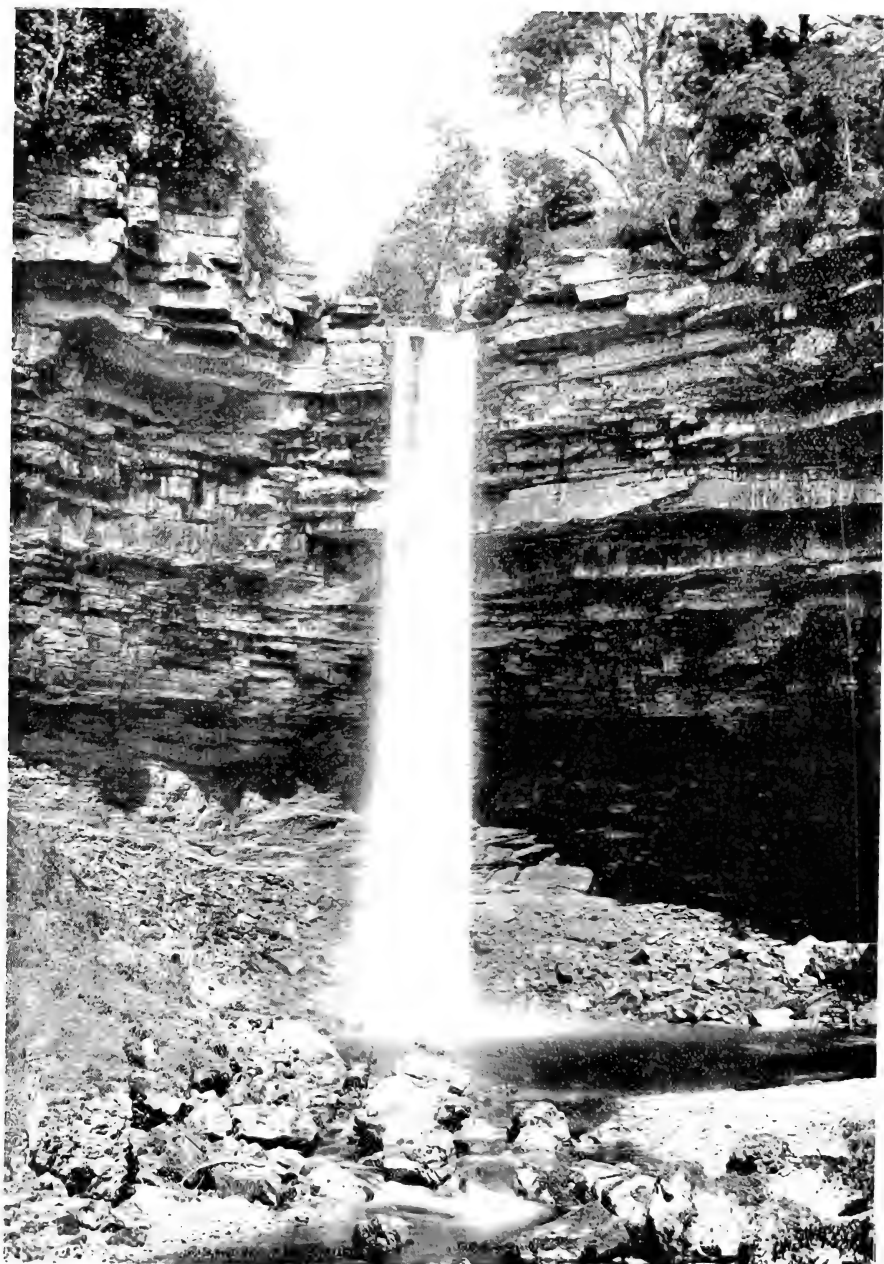
BOTANY.

Plant Associations near Pocklington.—An instance of complicated plant associations was noticed on Allerthorpe Common during the Pocklington excursion of the Yorkshire Naturalists' Union. Under ordinary conditions the place is a flat bog, 10 or 12 yards across. On the day we saw it (7th August) it was almost dry. Apparently the dry summer, up to that period, had brought about adverse conditions for bog plants. There did not appear to be any ground oozings of any moment to supplement the rainfall. The bog plants were giving way and 'dry-land' plants stepping in, creating for the time being a most peculiar series of associations. The bog plants were *Sphagnum*, *Menyanthes trifoliata*, *Glycerio fluitans*, *Potamogeton plantagineus*, *Ranunculus flammula*, *Hydrocotyle vulgare*, *Galium palustre*, *Juncus effusus*, *J. articulatus*, and *Polytrichum commune*. The *Sphagnum* was apparently dead, while some of the others had lost much of their wonted vigour. It is not often one sees a tuft of Yorkshire Fog (*Holcus lanatus*) growing out of a bed of *Sphagnum*. Nor does one expect to find the following on boggy land in the company of the above plants:—*Senecio vulgaris*, *Polygonum aviculare*, *P. Persicaria*, *P. Convolvulus*, *Chenopodium album*, *Potentilla anserina*, *Plantago major*, and *Leontodon autumnale*; yet they were all there, five being annuals, the first, and the three last, perennials. The Corn Bindweed (*Polygonum Convolvulus*) was actually insinuating itself among a tuft of rushes, and binding several rush stems in its embrace as one sees it entwining corn stems in a cornfield. On an adjoining bank *Epilobium angustifolium* and *Potentilla Tormentilla* were flourishing, with *Ranunculus repens* at the foot. Possibly the seeds of the intruders were bird-sown, carried from the cornfields and waste grounds on the outskirts of the common, the dry condition of the bog allowing these plants to enter into competition with the weakened marsh plants.—C. CROSSLAND, Halifax.



EGGS OF GREY PLOVER (Nos. 1, 2, 3, 4).
GOLDEN PLOVER (5, 6).

(From "Travels of a Naturalist in Northern Europe.")



Hardraw Scaur.
(See p. 349.)

REVIEWS AND BOOK NOTICES.

Picturesque Yorkshire (York and the North Riding). By **William Andrews**. (Valentine & Sons, Dundee, 118 pp.)

In this well printed and attractive little volume the principal charm unquestionably lies in the 40 beautiful plates. In fact to all appearances the letterpress has been written to describe the plates, as no one—not even Mr. Andrews—can be expected to describe the beauties, antiquities, and scenery of, and quote the poems, epitaphs, and traditions relating to York, Malton, Middlesbrough, Scarborough, Pickering, Whitby, Northallerton, Thirsk, Richmond, Leyburn, Runswick, and the 35 other places touched upon in the volume, in 118 by no means closely printed pages. To deal with York alone Mr. Andrews occupies to page 48, thus leaving 70 pages for descriptions of the 45 principal places in the Riding—an average of about a page and a half to each. Only Mr. Andrews would attempt to do this, and he has done his share in his characteristic style. In order to give a better idea of the nature of the plates, we are permitted to reproduce one herewith* (Plate XXIV.), though as the pages of 'Picturesque Yorkshire' are fully an inch less than a page of this journal, it will be seen that the blocks are rather large for the size of the book. The volume is neatly bound, but unfortunately it nowhere bears the date of publication, it has no index, neither is the price stated, though we are informed it is sold at half-a-crown, which is very cheap.

Travels of a Naturalist in Northern Europe. By **J. A. Harvie-Brown, F.L.S.**, etc. T. Fisher Unwin. 2 vols. 541 pp., plates and maps. Price £3 3s.

In these two handsome volumes, our valued contributor, Mr. Harvie-Brown, presents to the naturalist world the results of three journeys made to Norway, Archangel, and Petchora in 1871, 1872, and 1875 respectively. In his preface the author gives good reasons for not having published his observations previously. Those who know Mr. Harvie-Brown and his numerous writings will naturally expect to find the greater part of his recently-published volumes devoted to the fascinating study of ornithology. In this they will not be disappointed, though, inter alia, there is much valuable information likely to be of service to the geographer or traveller. The volumes are arranged on the lines of the very interesting diaries which Mr. Harvie-Brown kept during his various rambles. On his

first trip, or 'preliminary canter,' as he calls it, our author was in company with the late E. R. Allston. In the following year the two naturalists were again afield, and spent many weeks among the numerous islands of the Dvina Delta. 'But 'eastward still' only rang louder in our ears or postured in our dreams, when we seemed at last merely to touch the fringe of the nesting distribution of the Little Stint, by obtaining a specimen or two in full breeding plumage on the furthest outer islands of the Delta. Ah! only passing migrants going 'eastward still'!' In 1875, in company with Seebohm, Harvie-Brown went 'eastward still,' the important results of which have partly previously appeared in the 'Ibis' and elsewhere. Many, however, of the particulars of this last trip are now given for the first time, whilst no detailed account has previously appeared of the first two northern excursions. Mr. Harvie-Brown's volumes are well illustrated by portraits, sketches, excellently-drawn maps, and two beautifully-executed coloured plates. Amongst the first-named, we are glad to notice photographs of Seebohm, Allston, and our author. The coloured plates are devoted to representations of birds' eggs. One of these shows a beautiful series of eggs of Stints. The other contains a representation of four eggs of the Grey Plover, taken in North-east Russia by Seebohm and Harvie-Brown; and two eggs of the Golden Plover from the collection of Mr. H. E. Dresser, showing *extreme* variation. Typical eggs are very difficult to distinguish from the Grey Plover's. By the courtesy of the publishers we are able to let our readers see a reproduction of the latter (Plate XXI.).

We can strongly recommend the work to readers of 'The Naturalist' and can assure them that it contains much that will interest and instruct them. There is an extensive Appendix, giving an analysis of the list of birds observed, which will be useful in considering the unsolved mysteries of migration. There are also some useful observations in the work on the question of the colouration of eggs.



Trees: A Handbook of Forest Botany. By H. Marshall Ward, Sc.D., F.R.S., etc. Vol. III., Flowers and Inflorescences. University Press, Cambridge; pp. x., 402. Cr. 8vo., illustrated, 4s. 6d. net.

The third volume of this interesting series, by Professor Marshall Ward, has quickly made its appearance, and fully maintains the excellent qualities

*Another plate shows a view of 'Norman Arch, Easby Abbey.' It is sincerely to be hoped that some steps will be taken to preserve this arch. Otherwise, judging from the photograph, its days are numbered.

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of the earlier ones. The present one deals with flowers and inflorescences, and therefore, from a systematic point of view, is the most useful. The first half consists of twelve chapters dealing with the general morphology and physiology of these organs, and we have here, though much condensed, a great mass of information clearly and simply expressed. The more important points are amply illustrated by excellent figures, and all along the reader is kept well up to date. This is well shown in the short, but interesting and suggestive chapters on the development, fertilisation, and physiology of the flower, where the more recent work is never lost sight of. In the second half we have a systematic account of the numerous species excellently planned, the marginal references greatly facilitating the use of the book. Here is brought together many interesting points usually overlooked in text-books and floras, and a student who would work through a number of these descriptions, with specimens in hand, and sketch the parts determined would find it excellent practice. Much information is crowded into this volume, and teachers as well as students will find it of great value. A full glossary and very good index are provided.

The Uses of British Plants. By the **Rev. Prof. Henslow, M.A., F.L.S.** Lovell Reeve. Pages VI. + 184 with 288 illustrations. 4/6 net.

For those who wish to obtain readily the derivations and meanings of the names of many of our common plants, together with their uses, they will find this a handy volume. It is well and carefully got up, and the type and illustrations are clear. The latter are evidently from the blocks of 'Fitch and Smith's Illustrations of the British Flora,' though no reference is made to this in the very brief introduction.

In the 'Transactions of the Leicester Literary and Philosophical Society' (Vol. 9, Part 2, 1905), Mr. W. A. Vice gives an interesting list of casuals and aliens gathered at Blaby Mills. The annual statement of accounts of the same society shows a balance in hand of over £112.

NORTHERN NEWS.

The annual meeting of the Yorkshire Naturalists' Union will be held at Bradford on Saturday, 27th January 1906.

Mr. R. Standen has a paper on 'Reversed Shells in the Manchester Museum' in the October 'Journal of Conchology.'

Mr. Porritt informs us that two Huddersfield entomologists have bred 30 *Abraxas grossulariata* ab. *varleyata* during the past two seasons.

Mr. Harold Wager's address to Section K (Botany) at the British Association Meeting in South Africa, is printed in 'Nature' for 21st Sept.

Mr. George Bolam has presented fifty specimens of birds found in the vicinity of Berwick-on-Tweed to the Hancock Museum, Newcastle-on-Tyne.

The ancient chapel and oak dining-room at Townley Hall, Burnley's Art Gallery and Museum, have been thrown open to the public, and contain suitable exhibits.

A pure white Ringdove, with pink eyes, and also a pied Stockdove and Yellowhammer, have been shot and 'obtained' near Scarborough ('Zoologist,' September).

An excellent portrait of John Wesley Judd, C.B., F.R.S., etc., appears in the 'Geological Magazine' for September, together with a memoir, forming one of the 'Eminent Living Geologists' series.

The Horniman Museum, Forest Hill, S.E., continues to issue its useful Penny Handbooks. The latest deals with the Marine Aquaria, and describes the ingenious arrangement there in vogue for aerating tanks.

'Nature' for 31st August contains a brief account of the experiments being made on the Lancashire coast by the officials of the Lancashire and Western Sea Fisheries Joint Committee. The object of these experiments is to improve the condition of the public shell fisheries.

Early in October exceptionally high tides and strong winds caused considerable damage along the Yorkshire coast. Great quantities of land have been washed away, particularly in the boulder-clay districts, and at Easington the land was flooded. (See also pp. 335 and 336.)

A large sturgeon, caught near Goole early in August, and sold to a Goole firm, was claimed by H.M. Customs as the property of the Crown. The sturgeon was duly despatched to the King, who, however, returned it, stating that on this occasion he did not wish to enforce his right.

It is pleasing to discover that even our leading comic journals find Natural History items at times worthy of their notice:—‘HAS HE COME HOME? To the Small Mammals House at the Zoo has lately been added an *Arctictis Binturong*, known in its native Assam as *Bhal-billi*. We seem to recognise the name. Can it be our old friend *Bhil-balli* under a slight disguise?’—*Punch*.

The Annual Report of the Huddersfield Naturalists' and Photographic Society for 1905 has just been received. It speaks well for the work of the Hon. Treasurer to find that ‘there are now no subscriptions in arrears.’ It is not often that a remark of this kind is found in annual reports. Brief notes on the principal ‘finds’ during the year are given by the respective recorders.

Parts II. and III. of Mr. H. Bolton's valuable paper on ‘The Palæontology of the Lancashire Coal Measures’ have been reprinted from ‘The Transactions of the Manchester Geological and Mining Society’ as one of the well-known Museum handbooks issued by the Owens College Museum. The present contribution deals with the fossils of the Middle and Upper Coal Measures.

At the recent annual meeting of the Bradford Scientific Association Mr. H. E. Wroot was elected president for the coming year. The society has taken a prominent part during the last year in connection with the Museum at the Cartwright Memorial Hall and the Botanical Garden in Lister Park. It also took a lead in opposing the scheme of the Bradford City Council to place paths along the stream at the bottom of Shipley Glen.

Among the features of the October double number of ‘Bird Notes and News’ (issued by the Royal Society for the Protection of Birds, 3, Hanover Square, W.) are a special report of the recent International Ornithological Congress so far as it dealt with Bird Protection; an article on the Antarctic Penguins, by Dr. Wilson, of the ‘Discovery’; and a strong appeal to members and friends of the society to discourage the use of ‘ospreys’ and birds in autumn millinery, and to expose the fraud of the so-called ‘imitation’ or ‘artificial’ ospreys.

It is pleasing to find that Mr. E. R. Waite, at one time joint-editor of this journal, and now zoologist at the Australian Museum, Sydney, is frequently contributing to our knowledge of the natural history of the district in which he is now situated. The recently-issued ‘Records of the Australian Museum’ (Vol. 6, No. 1) contain the following articles from his pen, viz., ‘The Breeding Habits of the Paradise Fish,’ ‘An addition to the Lacertilian fauna of the Solomon Islands,’ ‘Climbing Habits of an Australian Snake,’ and ‘*Pseudaphrites urvillii*, Cuv. & Val., a Fish new to Western New South Wales.’

From the ‘Yorkshire Post’ we gather that a conference of representatives from the North, East, and West Riding County Councils was held in York on Wednesday, 27th September, to consider a petition from the Yorkshire Naturalists' Union. There attended from the West Riding Mr. W. Chadwick and Mr. C. D. Nicholson, from the East Riding Mr. W. H. St. Quintin and Mr. Fowler Burton, and from the North Riding the Earl of Ronaldshay and Mr. E. R. Turton. The close season was agreed upon as from the last day in February to the 1st of September, with exceptions in favour of the golden plover, snipe, woodcock, and wild duck. A list of birds and birds' eggs to be prohibited for the next five years was drawn up, and it was unanimously agreed that no shooting, snaring, or taking of wild birds should be allowed on Sundays throughout Yorkshire.

OV 1905

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BOTANY. ZOOLOGY. GEOLOGY.

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NOTES AND COMMENTS.

A NIGHTINGALE'S NEST.

In the October 'Bradford Scientific Journal' Mr. W. J. Forrest has an interesting picture of a Nightingale's nest, which we are permitted to reproduce. In describing this, Mr. Forrest informs us that last spring he heard of the nightingale breeding near Selby. On visiting the locality he was fortunate enough not only to see the bird and hear it in full song, but to find the nest and have it photographed. The nest, which contained four



Nest of Nightingale.

eggs, occurred in a dark place among the entangled undergrowth close to the outer edge of a wood. It was about six inches from the ground; the outer and under structure was composed mainly of dead and skeletonised leaves of the oak, and the inside was lined with horse-hair. The nest much resembled that of a robin. We regret to learn from Selby that the nest and eggs of the Nightingale to which Mr. Forrest refers were stolen. If, as there is some reason to suppose, the theft was made by some so-called naturalist, it is an abominable shame, and one which calls for the reprobation of every lover of Nature.

THE CARTWRIGHT HALL MUSEUM.

The same journal contains the text of a lengthy and comprehensive memorandum in reference to the proposed natural history museum at the Cartwright Memorial Hall, Bradford. This was prepared by the Bradford Scientific Association, and has been considered by a Committee of the Bradford Corporation. 'The Committee decided to accede to the recommendations of the Scientific Association that the large room at the west end of the Cartwright Hall, with the adjoining small room, should be utilised for the accommodation of a natural history collection on the lines suggested in the memorandum. It was further agreed that the collection should be, as far as possible, confined to the natural history of Yorkshire, although the Committee reserved to themselves freedom to consider on their merits any other suggestions which might at any time be made, and also to accept, if thought desirable, any objects and specimens offered to them not of Yorkshire origin.' The scheme is a good one, but the Bradford Museum Committee are surely somewhat leisurely, not to say dilatory, in making a beginning in getting it into operation.

ANTHRACOMYA PHILLIPSI IN DURHAM.

In the November 'Geological Magazine' Mr. J. T. Stobbs records the occurrence of *Anthracomya Phillipsi* in the Durham Coalfield. 'The interest of the discovery lies in the proof of the existence of the *Phillipsi*-zone near to the top of the Coal-measures in the Durham Coalfield, and, so far as we may legitimately infer from the character of the immediately-overlying measures in other coalfields, that in all probability the pre-Permian denudation did not remove much of the Coal-measures that are of special commercial value, but, on the other hand, it has rendered the excellent coal-seams of that district much more accessible.'

A LEEDS SEWAGE WORKS FLY.

A paper in the recently-issued 'Transactions of the Entomological Society of London' forcibly calls to mind some notes by Mr. W. F. Baker on '*Hydrobius fuscipes*: Notes on its Life, History, Larvæ, Anatomy, etc.,' which appeared in this journal for November 1894. It is by Mr. J. A. Dell, of the Leeds University, and entitled 'The Structure and Life History of *Psychoda sexpunctata*.' The paper contains a clearly written account of Mr. Dell's observations, and is illustrated by a

number of carefully-drawn diagrams. From the notes we gather that *Psychoda* in all stages of growth abounds throughout the year at the Leeds Sewage Works. 'It obtains its food from heaps of coke, over which crude sewage is sprayed during the purifying process. The life which flourishes on the coke-heaps, and especially the bacterial life, effects the reduction of the sewage to a harmless liquid. Algæ, among which *Stigeoclonium tenue* is conspicuous, find here congenial conditions, and supply nutriment to insects of more than one kind. Besides *Psychoda*, a *Chironomus* and a beetle (*Platystethus*) occur. A *Scolopendra*, mites, and *Nais* have also been observed on the coke-heaps. . . . The fly is small and of grey colour. The wings are larger than the body, which they completely cover, and slope when at rest. Both body and wings are abundantly covered with grey hairs, which give the fly at first sight the appearance of a small moth, hence the name *Psychoda*.'

BOTANY.

***Riccia sorocarpa* Bischoff in Derbyshire.**—I collected this rare hepatic in Cave Dale, Castleton, Derbyshire, September 1904. I only know of one other station in the county for it (Miller's Dale). A specimen has been deposited in the Manchester Museum.—WM. HY. PEARSON.

***Malaxis Paludosa* in the North Riding of Yorkshire.**—On 2nd August of this year I was fortunate enough to find some plants of this interesting species on the slopes of Noon Hill, about $1\frac{1}{2}$ miles south-west of the High Force in Teesdale, on the Yorkshire side of the Tees (Vice-county 65). A little patch of *Sphagnum* moss, kept alive by a slight trickle among the heather which eventually falls into Skyer Beck, supported about a dozen plants, the largest about one inch high and with five flowers on the spike. Though I spent some little time searching on various likely places both above and below the spot, I did not succeed in finding any more. I cannot find any record of this species having been found in the North Riding since it was recorded by my great-grandfather, James Backhouse, as having been found by a miner named John Binks, who was frequently his companion on his botanical excursions in Teesdale (see 'North Yorkshire,' 2nd ed., p. 378). This find apparently occurred about 1850, and the description of the spot at which it was found would agree exactly with the locality in which I found it, and must at any rate have been within a few miles.—WILFRID B. ALEXANDER, York, 5th November 1905.

WILD BIRD PROTECTION IN YORKSHIRE.

At the suggestion of the Wild Birds Protection Committee of the Yorkshire Naturalists' Union, the Executive Committee of the Union fully considered the question of bird protection in the county, with the result that a petition was submitted to the Clerks of the County Councils for the three Ridings, a copy of which is given below :—

‘TO THE COUNTY COUNCIL FOR THE $\left. \begin{array}{c} \text{NORTH} \\ \text{EAST} \\ \text{WEST} \end{array} \right\}$ RIDING.

(The Humble Petition of the Yorkshire Naturalists' Union, the most representative body of naturalists in the county.)

Sheweth :—

- (1) That at the Annual General Meeting of the Union, held at Leeds on the 17th of December 1904, it was unanimously agreed that the County Councils for Yorkshire be respectfully approached on the subject of Wild Birds Protection.
- (2) It was further agreed that it is desirable in order to avoid confusion, and for the better protection of the birds, to make uniform the Wild Birds Protection Orders for the County of York.
- (3) That the close season for birds mentioned in the Schedule of the Wild Birds Protection Act (1880) be altered so as to be from the last day of February, to the 12th day of August.
- (4) The following birds to receive protection throughout the whole year, from the dating of the order until the 12th day of August 1910, i.e., for a period of five years :—

Common Buzzard.	Great Crested Grebe.	Barn Owl.
Honey Buzzard.	Black-headed Gull.	Tawny Owl.
Bittern.	Kittiwake Gull.	Kestrel or Windhover.
Bullfinch.	Little Grebe.	Kingfisher.
Cirl Bunting.	Dabchick or Douker.	Grey or Brown Linnet.
Dotterel.	Sand Martin.	House Martin.
Dipper or Water Ouzel.	Nightingale.	Raven.
Golden Eagle.	Nuthatch.	Redpoll.
White-tailed or Sea Eagle.	Osprey.	Swallow.
Peregrine Falcon.	Long-eared Owl.	Swift.
Goldfinch.	Short-eared Owl.	Terns (all species).

- (5) The eggs of the following birds to be protected for a period of five years from the date of the order :—

Bittern.	Cormorant.	Spotted Crake.
Cirl Bunting.	Curlew.	Dipper.
Common Buzzard.	Stone Curlew.	Dotterel.

Naturalist,

Dunlin.	Goldfinch.	Water-Rail.
Pied Flycatcher.	Redpoll.	Land-Rail.
Peregrine Falcon.	Tawny Owl.	Ring Plover.
Great Crested Grebe.	Barn Owl.	Snipe.
Little Grebe.	Long-eared Owl.	Woodcock.
Kingfisher.	Short-eared Owl.	Green Woodpecker.
Harrier.	Kestrel.	Great Spotted „
Hobby.	Merlin.	Lesser Spotted „
Heron.	Raven.	Wryneck.
Nightjar.	Mallard.	Grey Wagtail.
Nightingale.	Teal.	White Wagtail.
Bearded Tit.	Wigeon.	Yellow Wagtail.
Nuthatch.	Shoveller.	Black-headed Gull.
House Martin.	Pochard.	Kittiwake.
Sand Martin.	Tufted Duck.	Reed Warbler.
Swallow.	Shelduck.	Terns (all species).
Swift.	Turtle Dove.	

- (6) Sunday shooting to be prohibited throughout the county.
- (7) The areas at present proclaimed, viz., Spurn Promontory and Hornsea Mere, to be further protected for a period of five years from the dating of this order.
- (8) That in the neighbourhood of Speeton, Buckton, Bempton, and Flamborough Cliffs no Guillemots, Razorbills, or Puffins shall be shot between the last day of February and the first day of September.
- (9) That the other two Riding County Councils are being memorialised in similar manner to the foregoing.
- (10) Your memorialists therefore respectfully ask that under the circumstances, the Council will make the necessary applications.

Signed on behalf of the Yorkshire Naturalists' Union,

G. W. LAMPLUGH, President.

T. SHEPPARD, Hon. Sec.'

As a result of this petition, a meeting of the representatives of the three Councils was held, at which a report was drawn up, a copy of which we have been favoured with. It is as follows :—

‘The REPORT of the Representatives of the County Councils of the North, East, and West Ridings of Yorkshire on the Petition of the Yorkshire Naturalists' Union presented to the three County Councils.

At a meeting held at the Station Hotel, York, on Wednesday, the 27th September 1905, present :—Mr. W. H. St. Quintin (Chairman), Mr. D. F. Burton, East Riding; Mr. E. R. Turton, North Riding; Mr. William Chadwick, Mr. Charles Denton Nicholson, West Riding;

The Petition of the Yorkshire Naturalists' Union was carefully considered, and it was thought that the Orders for the Protection of Wild Birds should, so far as possible, be uniform throughout the County.

It was the opinion of the Meeting—

1. That the close season for birds mentioned in the Schedule of the Wild Birds Protection Act (1880) be altered so as to be from the last day of February to the 1st day of September, except as regards the following birds, viz. :—
Snipe, Woodcock, Golden Plover, and Wild Duck, and that for such birds the close season to be from the last day of February to the 12th day of August.
2. That the following birds be protected throughout the whole year, for five years, until the 12th day of August 1910 :—

Bittern.	Black-headed Gull.	Kingfisher
Buzzards.	Kittiwake Gull.	Grey or Brown Linnet.
Buntings.	Nightingale.	Raven.
Dipper or Water Ouzel	Nightjar	Redpoll.
Dotterel.	Nuthatch.	Swallows.
Eagles.	Osprey.	Swift.
Peregrine Falcon.	Owls.	Terns (all species).
Goldfinch.	Kestrel or Windhover.	Woodpeckers.
Great Crested Grebe.		

3. That the eggs of the following birds be protected throughout the whole year for five years :—

Bittern.	Heron.	Turtle Dove.
Buntings.	Nightjar	Water-Rail.
Buzzards.	Nightingale.	Land-Rail.
Curlew.	Bearded Tit.	Ring Plover.
Stone Curlew.	Nuthatch.	Snipe.
Dipper.	Swallows.	Woodcock.
Dotterel.	Swift.	Woodpeckers.
Dunlin.	Goldfinch.	Wryneck.
Pied Flycatcher.	Redpoll.	Wagtails.
Peregrine Falcon.	Owls.	Redshank.
Great Crested Grebe.	Kestrel.	Black-headed Gull.
Little Grebe.	Merlin.	Kittiwake.*
Kingfisher.	Raven.	Reed Warbler.
Harriers.	Wild Ducks.	Terns (all species).
Hobby.		

4. That the taking and killing, in any way whatsoever, of all wild birds on Sunday be prohibited.
5. That the areas at present proclaimed, viz., Spurn Promontory and Hornsea Mere, be further protected for a period of five years.†

* On the proposition of Mr. Mainprize, seconded by Alderman Burton, the Kittiwake was struck from this list.

† For the previous area see 'The Naturalist' for April 1903, p. 132.

It was pointed out that, while the birds and eggs included in the lists now approved would be protected in all the three Ridings alike, as was desired by the Naturalists' Union, yet there will be other birds and eggs included in the more comprehensive list approved by the Home Secretary as applicable to the West Riding. W. H. ST. QUINTIN, Chairman.'

The result of the petition must be met with approval by all Yorkshire Naturalists.

It is also pleasing to report that, in response to a request from the Union, the Bridlington Harbour Commissioners have given orders for the discontinuance of the practice of firing guns or rockets at the birds on Bempton and Speeton Cliffs from the pleasure steamers sailing from Bridlington. A similar request previously made to the Scarborough Harbour Commissioners by the President of the Yorkshire Wild Birds Protection (Mr. T. H. Nelson) has also been complied with. T. S.

LINCOLNSHIRE FRESHWATER MITES.

C. F. GEORGE, M.R.C.S.

Arrhenurus mollis. n.sp.—I have met with a mite, on more than one occasion, which possesses the peculiar palpi belonging to the genus *Arrhenurus*; the legs, epimera, and acetabular and genital plates, are also similar to a female *Arrhenurus*. It, however, differs in having the body skin soft and lined, without any chitinous layer, and without any appearance of the curved depressed line, which is so marked a feature on the dorsum of mites of this genus.

Fig. 1 is an outline figure of the dorsum showing its general appearance. It is seen to be almost circular. The creature, however, when alive seemed to me to be rather more octagonal than the figure indicates.

Any slight pressure, such as might be used to keep the creature in one position whilst drawing proceeded, would, of course, cause a soft-bodied mite to assume a more or less circular form. It has a number of fine hairs on the dorsum, and especially at the posterior part, some of which are very long, and similar to those which are found on most female nymphs of this

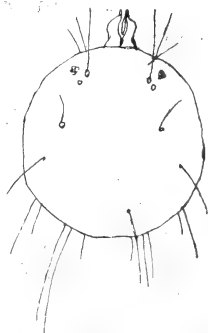


Fig. 1.

genus. That the mite has passed beyond the nymphal stage is evidenced by the well-developed genital and acetabular plates, as seen in Fig. 2.

Dr. Robt. H. Wolcott, of the University of Nebraska, has published in the 'Studies from the Zoological Laboratory,' May 1901, the description of a mite in some respects resembling *A. mollis*; he makes of it a new genus, and calls it *Steganopsis arrenuroides*. It differs, however, in two most important particulars. He describes it as possessing a chitinous exoskeleton,

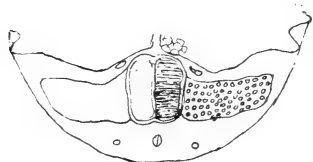


Fig. 2.

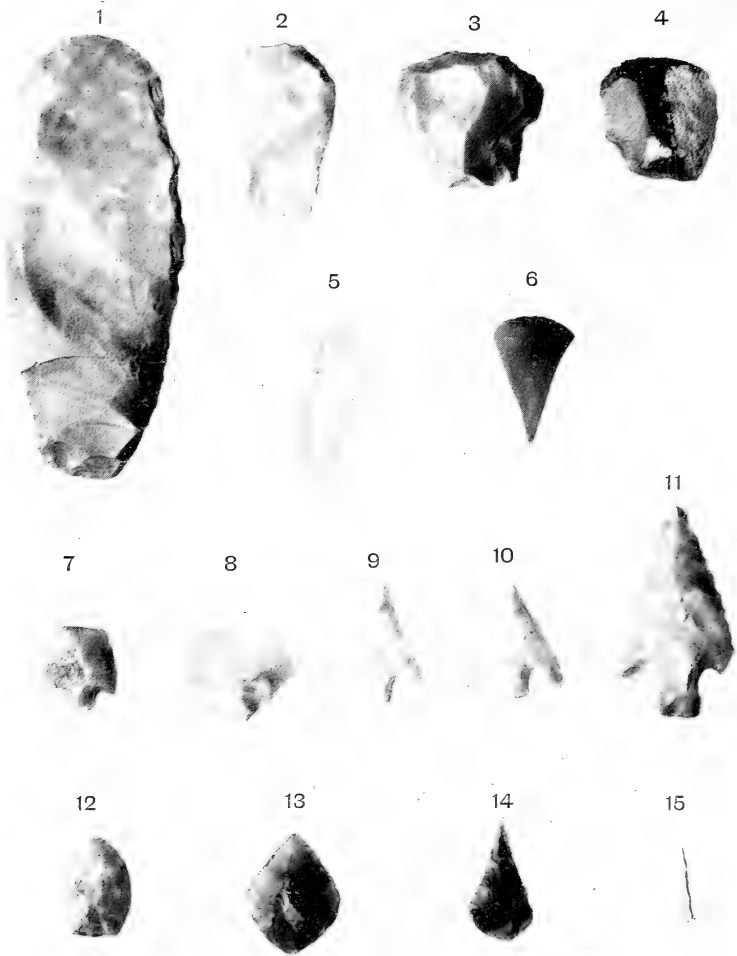
covered by the striated skin, and figured like network. There is no such structure in the mite now described. He also figures and describes the acetabula, as set into the meshes of the chitinous exoskeleton; whilst in *A. mollis* the

acetabula are set on distinct chitinous plates (see Fig. 2). The genital plates also differ: in *Steganopsis* they are figured and described as two movable lunate valves; whilst in *A. mollis* they are door-like (see Fig. 2). It might perhaps be as well to mention that the plates, on the left of the median line, in this figure are in outline only; but on the other side the lines on the genital plate, and the acetabula on the acetabular plate, are distinctly figured. I think it probable that the mite, as it became older, would change somewhat. I have found this to be the case in the males of this genus. Unfortunately, I have not met with an example this season, but if I again do so I intend to keep it alive, if possible for some time, and watch development. Should any other observer come across it, I hope he will take the hint and publish his notes in 'The Naturalist,' as the subject is of great interest.



Nottinghamshire Neuroptera and Trichoptera.—Some little time ago Prof. J. W. Carr sent to me for determination a number of neuroptera and trichoptera taken recently in Nottinghamshire, and among the names I sent him were the following, which may be worth recording:—*Raphidia notata* and *R. xanthostigma*, **Chrysopa septempunctata*, **Hemerobius elegans*, *Limnophilus fuscicornis*, *Silo pallipes*, **Notidobia ciliaris*, *Mystacides longicornis*, *Hydropsyche guttata*, etc. Of these the three species marked * have not yet been recorded for Yorkshire.—
GEO. T. PORRITT, Huddersfield, 10th November 1905.





Neolithic Implements from Durham
(slightly reduced).

NEOLITHIC REMAINS ON THE DURHAM COAST.

C. T. TRECHMANN, B.Sc.,

Castle Eden.

(Continued from p. 342.)

THE conditions have not been favourable for the preservation of relics of the Neolithic Age, other than those of stone. Of these, however, are a few types of a somewhat unusual character, which, together with the arrow-heads, are figured on Plate XXVI.

The largest arrow-head, measuring $1\frac{5}{8}$ inches in length (Plate XXVI., Fig. 11) resembles almost exactly in form that figured in Evans' 'Ancient Stone Implements,' p. 380, Fig. 304. It is stemmed and double barbed, of opaque grey flint, and is unweathered.

Two more smaller specimens are double barbed, one (Fig. 10) being a very symmetrical specimen; they are both of pinkish flint which has weathered white on the surface. They each measure a little over $\frac{7}{8}$ inch in length.

Two more are made of dark translucent flint. The first (Fig. 13) is roughly lozenge shaped; the second (Fig. 14) measures $\frac{1\frac{5}{16}}$ inch in length, and is chipped to an acute and almost needle-like point. The minute chippings at the point cannot be separately seen without a lens. There is nothing like it figured by Evans.

Another perfect specimen is chipped and leaf-shaped, but not pointed (Fig. 12).

A broken lozenge-shaped arrow-point (Fig. 8) and a broken barbed specimen complete the series of arrow-heads.

The three scrapers illustrated (Figs. 2, 3, and 4) present no unusual features. One of them is sand polished.

Fig. 6 shows a curious little implement. It is a triangular shaped splinter of brown flint, which has been chipped to a delicate, almost semi-circular, edge.*

The large implement (Fig. 1) has evidently done duty for a variety of purposes. The edge has been much worn from cutting or scraping, while the butt end is rounded and battered from being used as a 'fabricator.'

* It is probably a broken fragment of a larger implement.

Fig. 5 shows an implement of white, semi-transparent quartz, one end of which is distinctly rounded from use, though precisely what purpose this served it is difficult to say.

The small specimen illustrated (Fig. 15) resembles one of the 'pigmy' implements about which so much has been written; in this case, however, the theory of 'Pigmy' men is quite untenable, as it has clearly been fashioned by the same hands that made the rest of the implements, and shows the same condition of surface.

It is interesting to note that the most prolific sites for implements in this district occur on those parts of the coast which are best protected against the sea. The site to the north of Crimdon Dene is situated on a great mass of sand and boulder-clay, which is again protected from the sea by a large barrier of blown sand covered with coarse grass.

That near the Black Halls is some little distance from the cliffs, to the west of a small stream which runs nearly parallel to the coast. The limestone here is of a particularly hard and unyielding character, and weathers into stacks and caves before it falls.

The Horden settlement is protected on the coast-side by a large bank of boulder-clay which quite covers up the limestone beneath; in very wet weather the clay slips down in large masses. These offer a further resistance to the sea, which is again held back from the land by a 'storm beach' of large shingle.

The coast line of the northern half of the county, however, has no such efficient protections; the cliffs, though generally higher, are softer and more friable, and the boulder-clay is less in evidence. The many small ravines and sheltered gorges along the coast between Seaham and Sunderland should have formed excellent retreats for prehistoric man; yet repeated searchings have failed to yield more than about twenty flakes. The same applies to the whole of the coast between Sunderland and the mouth of the Tyne. It is quite possible that kitchen middens, etc., existed along this portion of the coast, but have been removed as a result of the persistent fall and tumble of the cliffs.

The following is a summary of the flints found up to the present on the coast sites:—

Mouth of Crimdon Dene:—Scraper, 1; flakes, 7.

Edges of Crimdon Dene and near the Coast:—Flakes, 30; cores, 3 (with a pebble of hard conglomerate, possibly used as a striker).

Crimdon Dene to Black Halls, in the ruts on old ploughed fields:—Scraper, 1; flakes, 50.

Black Halls, chiefly on ploughed fields near the hotel:—Scrapers, 7; borer, 1; very small implement, 1; cores, 12; flakes and chips, about 600; bruised quartzite pebbles, about 12.

Black Halls to Deneholme:—Scraper, 1. (Many flakes in edges of sea banks and ruts in ploughed fields.)

Deneholme to Horden:—Flakes, about 150; cores, 8 or 9.

Horden Station site:—About 600 chipped flints on the site of the old settlement.

Horden to Ryhope:—Scraper, 1. Flakes fairly plentiful.

Ryhope to Sunderland:—Flakes (very sparingly found), about 6.

Sunderland to South Shields:—Flakes, about 10, found at various times.

Near Westoe a well-formed flake was found on the summit of a stack of limestone, entirely cut off from the rest of the cliffs.

BOTANY.

Plants at Moortown.—The Forty-seventh Field Meeting of the Lincolnshire Naturalists' Union was held at Moortown on 25th August 1905. The ground worked was blown sand and fresh-water alluvium. The neighbourhood had only one very rare species, *Equisetum hyemale*, near the station, the only area in the county where it grows. Another interesting plant growing near by is *Pyrola minor*. *Solidago virgaurea* was fairly common in the open woods and sandy banks; *Hypericum pulchrum* was rare; and one plant of *Dipsacus sylvestris* was seen on the boulder clay adjoining the above soil. The sandy sides of the wide road to Caistor gave *Geranium pyrenaicum*, which has within recent years come down the slope from Nettleton; on the leaves of this plant was found the fungus *Uromyces geranii*. *Serratula tinctoria*, *Campanula rotundifolia* flore albo, *Lotus uliginosus* and *Scabiosa succisa* were found on the same road-side; in the open woods *Verbascum thapsus*, *Sagina nodosa*; on the river alluvium at the river head *Volulus sepium*, *Mentha viridis*, and *Potamogeton pectinalis*. In a stagnant pool in a wood known as the Raspberries was found floating in large numbers the Liverwort, *Ricciocarpus natans*, and the var. *terrestris*, which is the same plant—it lands to produce spores.

A. SMITH, Grimsby.

ON SEGREGATION IN IGNEOUS ROCKS.

COSMO JOHNS, M.I.MECH.E., F.G.S.

THE suggestion that cooling fluid masses of the igneous rocks may be comparable to saline solutions has often been brought forward. The writer proposes, by discussing certain observations that have been made on the occurrence of segregation in granites, to see if the theory of solutions would apply. It is hardly necessary to state that the great progress made in the study of alloys and fused mixed silicates is due in great measure to investigators having treated them as cases of reciprocal solutions of their several constituents, and by utilising physical and chemical methods of research to supplement the data obtained by the use of the microscope. That the theory of solutions should have been found to hold good for alloys and fused silicates rather strongly suggests that no difficulty should be experienced in applying it to the igneous rocks. That difficulties have arisen is only too evident, and it can but be suggested that those who have experienced the difficulties either were not sufficiently well informed as to what has been done in applying the solution theory to alloys and fused silicates, or suffered from lack of data relating to the rock they were discussing. This brings in the interesting question as to what constitutes sufficient data. Complete chemical analyses would come first: not only the average composition of the mass, but separate determinations of any differentiated portions. If, in addition, we know the thermal history it is very probable that by a strict application of the solution theory we should be able to predict the microstructure and the order in which the various minerals separated out, and all that would be left for the microscope would be to confirm the prediction. Unfortunately, the physical methods that have thrown such a brilliant light on the structure of alloys and slags have not been applied to the igneous rocks, so we are left to deduce from limited data the thermal changes they have undergone. A careful determination of the microstructure, with special reference to the order in which the minerals formed, is of great importance. That this insistence on complete chemical analyses is not unjustified may be proved by looking at the numerous partial analyses that are appended to so many papers.

When large masses of alloys are very slowly cooled and examined evidences of segregation are not uncommon, so that the appearance of similar features in certain igneous rocks is in no way astonishing. It is further noticed in alloys that these local segregation areas are distributed through the mass and

not confined to one particular region and often have sharply-defined boundaries, so their resemblance becomes still more striking. This feature is taken to imply that the mass was partially solidified, otherwise gravitation would have come into play, for their specific gravity is different from the normal mass. These features have been explained by discussing it as a case of reciprocal solutions, and it might be interesting to apply the same theory to a well-known rock like the Shap Granite and see if it applies. It is not proposed to give a list of references, for this was done by Messrs. Harker and Marr* in their valuable paper on this rock, from which most of the data used by the present writer was obtained. Briefly, the rock contains large porphyritic pink feldspars in a ground mass of early orthoclase, plagioclase, quartz, and later orthoclase. Distributed through the rock are dark patches or segregation areas, more basic in character, but still containing the large pink feldspars. There is this important difference between the normal and segregation areas: that in the former the quartz appeared before the later orthoclase, while in the latter the quartz is the last to separate out, though the silica content is lower than in the normal mass.

Petrologists are by no means agreed as to what it is that determines the order in which the various minerals separate out; the order of basicity has many supporters, while the even more impossible view that the fusion point of the minerals play a prominent part finds adherents. From the variation in the order in which quartz appears in the dark patches and in the normal areas of the Shap Granite, it would appear that neither basicity nor fusion point are determining factors, and it might not be out of place to see if the solution theory will apply. The general and regular distribution of the porphyritic pink feldspars through both normal and segregated areas implies that they were formed as a result of the slow cooling of the mass through the critical point of the cooling curve corresponding to the separation of that mineral from the mother liquor. The conclusion of Messrs. Harker and Marr, that the formation of the large feldspars was prior to intrusion, seems to be well founded. There is further evidence that after intrusion cooling took place at a very slow rate, and this, coupled with the viscid condition of the mass, would complete the conditions necessary for segregation to take place. It might be pointed out that the distribution of the porphyritic feldspars is very similar to that of Tin-antimonide, in the alloy of 80 per cent. tin and 20 per cent. antimony.

It seems a permissible deduction, from the fact that the large feldspars are not rounded or corroded in the normal areas, to

* Q.J.G.S., 1891, p. 266.

assume that there was no marked disturbance of physico-chemical equilibrium at the moment of intrusion. If the magma were under great pressure its temperature would be higher than that corresponding to the orthoclase critical point, and any considerable decrease of pressure at the moment of intrusion would leave the mass in a superheated condition, and equilibrium would be destroyed. The mother liquor would have commenced to attack the orthoclase crystals until stability was once more restored. There does not appear to be any sign of this, so we may conclude that the intrusion was not marked by any great decrease of pressure. In the dark patches, however, the porphyritic feldspars are corroded and worn, so we have here clear evidence of a local disturbance of equilibrium. The explanation of the corrosion of the large feldspars in the dark patches appears to be that after segregation took place they found themselves surrounded by a mother liquor more basic in character than that from which they originally separated, and commenced to enter into solution again.

There is, however, another feature in the dark patches that has been mentioned but not discussed. Quartz is the last mineral to separate out in the segregation areas, but appears before the later orthoclase in the normal granite. The silica content of the normal area we have seen is higher than that of the segregation ones, but it is not well to rely too much on that, for it would imply that quartz would be more liable to be the last to separate in the normal granite, while the opposite is the case. In a reciprocal solution it is the excess constituent in the unconsolidated portion or mother liquor at each stage of consolidation that has to be dealt with. In the segregation areas the result of the successive formation of the several minerals is that some silica is the excess constituent at the last, and appears as quartz, but leaving traces of the entectic represented by the occasional occurrence of a micro-pegmatitic intergrowth of quartz and orthoclase. In the normal granite the conditions towards the later stages of the consolidation of the rock are such that the excess silica is thrown out from a mother liquor corresponding in composition to the later orthoclase, which was then left to crystallise out after the formation of the quartz. Owing to limitation of space it is not possible to deal with other interesting features of this rock. The writer, however, hopes that enough has been done to make it probable that no difficulty should be experienced in considering the igneous rocks as reciprocal solutions. The task would be much simplified if all investigators were as careful as Messrs. Harker and Marr in their observations.

FUNGUS FORAY AT MALTBY.

C. CROSSLAND, F.L.S.,

Halifax.

(Continued from p. 340.)

IN Nor Wood, Roche Abbey Valley, a fine lot of the parasol mushroom (*Lepiota procera*) was seen growing in a distinct ring among fallen larch-leaves. The beautiful, little chalk-white *Marasmius epiphyllus* was very common on dead herbaceous stems in most of the woods. A thick piece of dead thornwood, lying half in the water in Maltby Dike, was specially tested for *Rhizina Oocardi*, the only kind of wood upon which, and only under similar conditions, we have hitherto found it; it was there all right enough, but not in quantity. There being wood sanicle in Maltby Wood, its parasitic rust—*Puccinia saniculæ*—was looked for; after searching a short time and not seeing it, there was a suggestion to try the plants growing on the path sides, and there it was. The knot-grass on the road sides in the village was also tried for its parasitic rust—*Uromyces polygoni*—with almost a certainty of finding it; the first handful plucked was nearly smothered with it; it is mostly found on plants growing in or near villages, or about field gateways, and on the sides of field paths. Probably the spores find more ready means of distribution in such situations than when their hosts grow in places less frequented by animals and human beings.

The foray was not all work and no play. On our Wednesday wanderings we came across a signboard before which all pulled up. It was conspicuously painted in black letters on a white ground, and could almost have been read in the night-time. It was at the entrance to a track at a wood corner leading to a farmhouse. Evidently the farmer was determined not to be troubled by tripper, tourist, or tramp. The sign read:—

NO ROAD. NO STABLING.

NO HOT WATER FOR TEA.

BEWARE OF THE BULL DOG.

While we were admiring this emphatic signboard, a pert, three-quarter-grown fox-terrier, with a black patch around his right eye, barked away 'as savage as a razor-grinder'; in his wake there loomed up a sleepy, innocent-looking hound with liver-coloured haunches and flabby, drooping, yellow-brown legs. One of our party, admittedly not well versed in 'doggy'

distinctions, wondered which was the 'Bull Dog.' As none of the negatives were needed, and the bull dog a myth, the situation was enjoyed as an amusing diversion from toadstool hunting.

Mr. Needham and one or two others paid special attention to the collecting of micro-species, seventy or eighty being the result. Among them were the following Myxomycetes :—*Ceratiomyxa mucida*, *Stemonitis fusca*, *S. typhina*, *S. Friesiana*, *Arcyria punicea*, *A. incarnata*, *A. cinerea*, *Trichia fragilis*, *T. varia*, *T. fallax*, *T. affinis*, *Didymium farinaceum*, *D. squamulosum*, *Spumaria alba*, *Craterium confusum*, *Physarum sinuosum*, *Tillemadoche nutans*, and *T. mutabilis*. The collecting generally was done by small parties of three or four; thus more ground was covered and at the same time better worked.

Day after day the quantity of stuff, great and small, brought in was almost bewildering. As usually happens at forays in good seasons, more material was collected than could be dealt with in the time at disposal, although three of the members took turns at the work tables for whole days. The weather was very favourable for collecting purposes; a light, twenty minutes' fall on Tuesday was all the rain we had during the daytime.

On Tuesday evening an exhibition of species suitable for the purpose was arranged by Mr. Clarke, who went to great trouble to make it a success. The room being a typical one for the occasion, with ample table space, a good show was made. (Plate XXIII.) The exhibits were labelled and arranged in the sequence in which they appear in the 'Yorkshire Fungus Flora.' Suitably-coloured printed labels indicated the positions of the various coloured spore groups in the Agaricaceæ. Large printed labels were also provided for every group of fungi represented on the tables. All the larger specimens were fixed up in their natural positions on specially prepared stands, the smaller ones being laid on the labels. This arrangement afforded students ample opportunity to study any species they chose and compare them with the technical descriptions in the text books. The new members were glad of the opportunity, and made the best possible use of it.

The stereo-photos and drawings by Clarke, Gibbs, and the Secretary were also made good use of by both members and visitors.

The same evening Mr. Holland read a valuable paper, completing a series of four, on 'Economic Fungi.' The paper was illustrated by a fine collection of life-size coloured drawings of edible species. This paper, which will appear in due course,

brings the subject up to date, and furnishes evidence of a great amount of careful research. It is said there are 740 species of fungi known which may be cooked and eaten with safety, or can be utilised for some other economic purpose. Some of the members looked somewhat askance at the mention of *Boletus satanas*, *B. luridus*, *B. piperatus*, and *Hypholoma fasciculare* as edible species; Mr. Holland, however, said that he had good authority for his statement, though he had not tried them himself. This series of papers, taken as a whole, deal more fully with this side of the subject than any work hitherto published.

The edible species on exhibit were grouped together to illustrate the paper.

Several Maltby people who had expressed a desire to see the exhibition were present by invitation, and took much interest in the 'show' and proceedings.

A box of specimens was received from Mr. Snelgrove, Sheffield. Mr. Holland brought a good list of species collected at Woodhall Spa, Lincolnshire, by Mrs. Crosland Taylor; this was passed on, in due course, to the secretary of the Lincolnshire Naturalists' Union.

Miss Lucy Reynolds, B.A., of Kendal, sent to the meeting a most interesting fascicle of fifty-seven water colour sketches of fungi for identification. They had been made by Miss Reynolds during the present autumn from specimens collected on Posser Fell, Westmorland. This lady stated in her communication accompanying the drawings that she 'began them from an artistic delight in their beauty, not with any idea of scientific study: now that I see more of their variety, I long to know more of them.' They were mostly agarics, and the specific characters were so faithfully portrayed (though the lady herself said they were diagrammatic) that nearly all were recognised and named.

The total number of species identified is 401:—

Gastromycetes ...	10	Uredinacæ ...	10
Agaricacæ ...	233	Ustilaginacæ ...	2
Polyporacæ ...	25	Pyrenomycetes...	19
Hydnacæ ...	2	Discomycetes ...	47
Clavariacæ ...	9	Phycomycetes ...	5
Thelephoracæ ...	7	Hyphomycetes...	10
Tremellacæ ...	4	Myxomycetes ...	18

Twenty-three species have only once previously been recorded for Yorkshire, while the following eight are new to the county:—*Clitocybe sub-involutus*, *Mycena lineata*, *Cortinarius* (*Phieg.*)

decoloratus, *C. (Phleg.) scaurus*, *C. (Ino.) arenatus*, *C. (Tela.) helvelloides*, *C. (Hygr.) uraceus*, and *Penicillium hyphomycetis*.

Seven or eight boxes of microscopic material were brought away for home examination.

The full list of species, with habitat and locality, is held over to be published in the Union's Transactions.

The business meeting was held on Wednesday evening. Two new members were added to the Union as a direct result of the foray—Mr. Thos. Smith, Alderley Edge, near Manchester, and Mr. J. Ackroyd, Heckmondwike, both of whom are likely to prove useful additions to the Mycological section. Votes of thanks were heartily accorded to the Earl of Scarborough and to Mr. S. Jebb, J.P., Firbeck Hall, for permission to visit their estates. The authors of the 'Yorkshire Fungus Flora' were congratulated on the completion and publication of what the committee considered a much-needed work; one likely to be useful, not only in our own, but in other counties as well, and may be the means of creating new interest in the subject. The officers and committee to be recommended for the Mycological section for 1906 are as follow:—Chairman, G. Massee; Secretary, C. Crossland; Representative on Executive, C. Crossland; other members, Rev. W. Fowler, Liversedge; Harold Wager, Leeds; A. Clarke, Huddersfield; W. N. Cheesman, Selby; Thos. Gibbs, Wirksworth; J. H. Holland, Kew; C. H. Broadhead, Thongsbridge; and J. W. Sutcliffe, Halifax.

It was decided to recommend Sledmere, in S.E. Yorkshire, as the place for next year's foray, and to hold the meeting in the early part of September: date to keep clear of the British Association Meetings at York.

The usual sampling of a few edible species at breakfast was indulged in. On the several mornings about eight species were cooked, including a couple of pounds of the beef-steak fungus, which was considered a great delicacy: and tender.

As to the head-quarters, it will be impossible to find a better place anywhere than the 'Swan,' at Maltby. The catering was A 1, and we had every accommodation needed, both for work and rest. The indoor facilities were ideal for the kind of meeting we aimed at holding this time. The genial host, Mr. Weightman, entered into the spirit of the business from the first, and interested himself in it to the close.

Some observations 'on the Pairing, Ovi-position, and Egg of *Chrysophanus phleas*' and on '*Polommatus astrarche*' in Durham appear in the October 'Entomologist's Record.'

YORKSHIRE NATURALISTS' SOCIETIES.

THE following particulars have been obtained from the annual returns supplied by the various Secretaries to the Secretary of the Yorkshire Naturalists' Union. It will be seen that there is a satisfactory increase in the number of societies and associates connected with the Union, as compared with the list which appeared in this Journal for December, 1903.

The total membership of the 37 societies now affiliated with the Union is about 2,900, an average of about 75 for each Society.

Name of Society.	Name and Address of Secretary.	Number of Members.	Annual Subscription.	Meetings.
Ackworth School Natural History Society.	E. B. Collinson, Ackworth School, near Pontefract.	70	1/6	Fort-nightly during term.
Barnsley Naturalists' and Scientific Society.	H. Wade, 10, Pitt Street, Barnsley.	140	10/6, 6/-, and 3/-	Fort-nightly.
Bootham School Natural History Club.	F. E. Pollard, M.A., Bootham School, York.	38	—	Fort-nightly.
Bradford Natural History and Microscopical Society.	F. Jowett, Wilton Street, Bradford.	63	4/-, e.f. 1/-	Fort-nightly.
Bradford Scientific Association.	G. S. Wallace, 78, Horton Grange Road, Bradford.	194	5/- and 2/6	Weekly.
Clayton West Naturalists' Society.	F. Lawton, Carlton Terrace, Skelmanthorpe, Huddersfield.	11	2/-	Monthly.
Cleveland Naturalists' Field Club.	T. A. Lofthouse, F.E.S., 62, Albert Road, Middlesbrough.	110	5/-	Monthly.
Craven Naturalists' and Scientific Association.	T. H. Holmes, 20, Castle View Terrace, Skipton.	92	10/6 and 2/6	Monthly.
Crosshills and District Naturalists' Association.	H. Cowling, 23, Skipton Road, Silsden.			Fort-nightly.
Darlington and Teesdale Naturalists' Field Club.	G. Best, 20, Bondgate, Darlington.	68	5/-	Weekly.
Doncaster Scientific Society.	H. H. Corbett, 9, Priory Place, Doncaster.	152	5/- and 2/6	Fort-nightly.
Elland Naturalists' Society.	J. H. Whiteley, 20, Richmond Terrace, South Lane, Elland.	27	5/-	Fort-nightly.
Goole Scientific Society.	O. C. Hudson, Free Library, Goole.	30	2/6	Fort-nightly.
Greetland and West Vale Naturalists' Society.	W. Moore, 12, Haigh Street, Greetland.	21		Monthly.
Halifax Scientific Society.	F. Barker, 11, Hall Street, Halifax.	144	2/6	Fort-nightly.
Heckmondwike Naturalists' Society.	S. Grayson, Flush, Heckmondwike.	27	2/6	Fort-nightly.
Huddersfield Naturalists' and Photographic Society.	W. E. L. Wattam, 54, Towngate, Newsome, Huddersfield.	158	4/-	Monthly.
Hull Co-operative Field Naturalists' Club.	W. Litchfield, 76, Newstead Street, Hull.	26	1/-	Monthly.

e.f. = Entrance fee.

YORKSHIRE NATURALISTS' SOCIETIES—*continued.*

Name of Society.	Name and Address of Secretary.	Number of Members.	Annual Subscription.	Meetings.
Hull Scientific and Field Naturalists' Club.	T. Sheppard, F.G.S., The Museum, Hull.	170	5/- and 3/-	Fortnightly in summer, weekly in winter.
Hull Geological Society.	J. W. Stather, F.G.S., 16, Louis Street, Hull.	76	5/-	Monthly.
Leeds Conchological Club.	F. Booth, 43, Victoria Road, Saltaire, Shipley.	11	Levy	Monthly.
Leeds Co-operative Naturalists' Field Club.	A. Hodgson, 44a, Lincoln Road, Leeds.	77	1/-	Monthly.
Leeds Geological Society.	W. Parsons, Horsforth, Leeds.	70	5/-	Monthly.
Leeds Naturalists' Club and Scientific Association.	J. M. Butler, 214, Tempest Road, Leeds.	75	6/-	Fortnightly.
Lindley Naturalist and Photographic Society.	J. Ackroyd, Ainley Top, Lindley, Huddersfield.	65	1/-	Weekly.
Malton Naturalists' Society.	Rev. F. J. R. Young, 9, East Mount, Malton.	92	5/- and 2/6	Fortnightly.
Milnsbridge Naturalists' Society.	B. Goldthorpe, 12, Spring Gardens, Milnsbridge.	100	10/-, 5/-, 2/6, and 1/-	Weekly.
Ravensthorpe Naturalists' Society.	H. Parkinson, 2, Garden Terrace, Ravensthorpe.	43	1/3	Monthly.
Ripon Naturalists' Club and Literary and Scientific Association.	B. M. Smith, Dulce Domum, Ripon.	61	4/-	Monthly.
Rotherham Naturalists' Society.	G. Howard, Sitwell Vale, Moorgate, Rotherham.	23	5/- and 2/6	Fortnightly.
Scarborough Field Naturalists' Society.	D. W. Bevan, 32, Nansen Street, Scarborough.	85	4/-, e.f. 1/-	Fortnightly.
Scarborough Philosophical and Archæological Society.	H. Ascough Chapman, 13, Westborough, Scarborough.	95	£1, 10/-, and 5/-	Fortnightly.
Sheffield Naturalists' Club.	C. Bradshaw, F.C.S., Public Museum, Sheffield.	164	10/- and 5/-	Monthly.
Slaithwaite Naturalists' Society.	C. S. Pitblado, Scarr Hall, Slaithwaite.	53		Fortnightly.
Thirsk and District Naturalists' Field Club.	J. E. Hall, Market Place, Thirsk.	63	6/-	Monthly.
Wakefield Naturalists' Society.	H. G. Townsend, Myrtle House, Altofts, Normanton.	36	2/6	Fortnightly in winter.
York and District Field Naturalists' Society.	A. H. Brierley, "Galtres Edge," Stockton Lane, York.	97	4/-	Fortnightly.

e.f. = Entrance fee.

Fishes I have Known. By A. H. Beavan. (T. Fisher Unwin, 5s.)

This is evidently a companion volume to 'Animals I have Known' and 'Birds I have Known,' already noticed in these columns, and is written much after the same style. Of the three volumes, however, we prefer the last. It contains several anecdotes, etc., likely to interest and instruct the young naturalist. The volume includes notices of whales, porpoises, and the Pearly Nautilus—items which we should perhaps not have expected. The illustrations are fairly numerous, and of varying worth, that on page 37, representing a 'sperm whale,' being worthy of a place in 'Punch.' The book can be recommended as a suitable gift to young naturalists.

Naturalist,

HIGH TIDES IN MORECAMBE BAY.

J. WILFRID JACKSON,
Manchester.

WHILST spending a few days at Silverdale, Lancashire, at the beginning of October, I paid some attention to the tides and their action upon the shore.

The shore here is composed for the most part of a stretch of salt-marsh about a quarter of a mile wide, backed up by Carboniferous Limestone cliffs.

At the foot of this marsh flows the river Kent, which, for some time past, has been fairly consistent in keeping to this channel, although it is not to be depended upon for long at



Erosion of Salt-marsh.

a stretch, as, like other rivers running into the bay, it is continually changing its channel, sometimes skirting the Grange shore, sometimes the Silverdale shore, and occasionally steering a middle course.

This changing is occasioned by the heavy seas shifting the sand about and damming up the existing channel, when the river has perforce to make a new one through the weaker portions of the sandbanks.

The salt-marsh is cut up by several dikes of freshwater, and for some considerable time has been left uncovered by the tide. This year's equinoctial tides, however, have been exceptionally high and the whole area of the marsh was covered several times, the sea washing the base of the limestone cliffs and quite covering the older shingle-beach at their foot.

On the occasion of my visit there was a 21 ft. tide—the highest of the autumnal tides—and this, by beating against the edge of the marsh and running up the dikes, tore up the large tenacious sods several inches thick and flung them about in all directions.

The destruction was most severe at the mouth of one of the dikes, and here the sea laid bare a fringe of rocks covered with dead barnacles which must have been hidden away for years.

Some of the older residents and the fishermen told me that the sea had not been up so far at Silverdale for some fifty years, and farmers had begun to look upon the marsh as affording permanent pasturage for hundreds of sheep. In fact, with a view to still further strengthening the marsh from any chance inroads of the sea or river, a wall was erected along the edge



Tidal Bore in the Kent.

facing the sea. The remains of this wall can now be seen at low tide some distance away from the present shore.

It was interesting to stand on the marsh looking seawards and watch the tidal-bore driving up the channel of the Kent. This I did on several occasions, and was repeatedly disappointed in not being able to successfully photograph it owing to the violence of the wind and the rapidity with which the bore came in. I was successful, however, on one of the quieter days, as the accompanying photo will show. This was taken about a hundred yards from head of tide, which was the nearest point attainable, as a few yards nearer it broke on a fringe of rocks and the widening shore.

The crest on this occasion would be quite two feet high, and appeared to be running over the river water.

It will be remembered that this driving up of the bore was the cause of a fatal accident higher up the river, at Sandside, at the end of August last, when a party of Oldham excursionists were precipitated into the water, many of them being drowned.

There are several very interesting accounts of high tides on this coast contained in the '*Annales Caermoelesenses*,' published in 1872, one of which describes the destruction of the Winder Low Marsh in the autumn of 1828. For the purpose of preventing the sea from overflowing the land an embankment was constructed in 1808. It was three miles in length, and 10 feet to 15 feet in height, and was formed of sea sand and faced throughout with marsh sods $3\frac{1}{2}$ inches in thickness. About 600 acres of land were thus enclosed.

In the year 1827, however, it was observed that the river Leven was changing its course and making towards a channel which tradition says it occupied about one hundred years before.

This changing of the channel resulted in the entire destruction of the embankment, owing to the river undermining and washing away the sandbanks, and about 200 acres of arable land and 200 acres of marsh land were washed away by the sea.

Although the river was mainly responsible for the destruction of the embankment, still, for some years previously, it had suffered from repeated high and stormy tides, and the sward on the outer slope was almost worn away, so much so that fears were entertained for its safety, and the embankment was further strengthened by a covering of sea sand and loamy gravel.

Another account in the same book deals with the famous high tide of December 1852, when the water rose two or three feet above the highest tide known in the Morecambe estuary (22 feet), although, according to the tide tables, it was calculated to be a tide of 16 feet 6 inches only.

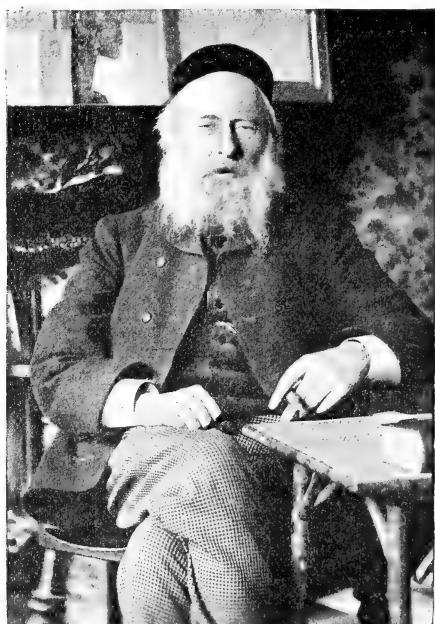
This extraordinary rise of the sea overtopped nearly all the sea embankments in the parish of Cartmel and covered most of the low land round about, including Holker Park, where it reached to within 400 to 500 yards of Holker Hall.

The same book goes on to say that it has been observed that these monstrous tides have occurred on this western coast of the kingdom periodically (about every 25 years), and that another might occur about 1877.

I can find no record of any extraordinary tide in 1877, but it is interesting to compare the above accounts of high tides with the high tides this year, and it is just possible that these are the periodic heavy tides which, according to the above account, were due in 1902.

THE LATE ELI SOWERBUTTS.

AN appreciative memoir on the late Eli Sowerbutts, whose death has already been noted in these columns, appears in the recently-issued 'Journal of the Manchester Geographical Society'—a society for which Mr. Sowerbutts did so much. This is illustrated by a portrait which we are kindly permitted to reproduce. 'He was a true representative' of genuine Lancashire character. Careless about outward appearance, but thorough in everything he undertook, and unflagging in his work; he shunned no labour, and was discouraged by no



difficulty. . . . Rough and rugged in manner, making light of every personal trouble, he had the tenderest sympathy with the joys and sorrows of his many friends. Those who were privileged to penetrate below the unceremonious manner he took pleasure in assuming discovered a genial nature which responded to every appeal, and made them lasting and loving friends.' Perhaps Mr. Sowerbutts will be best remembered by many of our readers for the part he took in connection with the meetings of the Corresponding Societies' Committee of the British Association, when he frequently enlivened the proceedings by his brief but pointed speeches.

Naturalist,

REVIEWS AND BOOK NOTICES.

The Origin and Influence of the Thoroughbred Horse. By Prof. W. Ridgeway. Cambridge University Press, 1905. 12s. 6d. net.

In this excellent book it is difficult which to admire most—the author's enthusiasm for his subject and the ability with which he endeavours to show the best horses are derived from a North African stock (which he refers to as the Libyan Horse), or his profound knowledge of geology, archæology, anatomy, and other sciences, the aid of all of which is requisitioned to supply him with data. The result is a most valuable and important volume, which will appeal not only to all those interested in horses in whatever way—but to the student of natural history and to the antiquary. In Chapter III. (The Horses of Prehistoric and Historic Times) there is every evidence of much research on the part of our author. No possible source of information appears to have been neglected, and in it are references to discoveries in East Yorkshire, etc., the result of the work of our contributor Mr. J. R. Mortimer and others. An idea of the scope of the work can be gathered from the author's preface. He says:—'The present work is an attempt to solve one of the chief problems in the history of the horse, the most important (the ox not excepted) of all the animals domesticated by man. The nature of the inquiry rendered it necessary to treat not only of all the chief breeds of domestic horse known in historical times, but also to take a survey of all the other living Equidæ, as well as of the ancestors of the genus. The question of colouration naturally holds a prominent place in the investigation, and I have tried to trace historically the origin of the various colours found in domestic horses. At the same time I have endeavoured to indicate . . . the influence exercised on the history of the chief nations of the ancient, mediæval, and modern world by the possession of horses, and especially by the acquisition of what I venture to term the Libyan horse.' The book is enriched by about 150 illustrations of a most interesting character.

Wild Flowers, Month by Month. Two Volumes. F. Warne & Co. 12s. net.

In these two admirable volumes Mr. Edward Step has unquestionably provided a work which, of its kind, stands alone. We have frequently referred recently to the charming way in which books are nowadays produced as regards general appearance and the quality of the illustrations. It often happens, however, that the accompanying letterpress is weak—in some instances merely a sort of 'padding' to the pictures. Not so in 'Wild Flowers, Month by Month.' The author has not only provided a most admirable picture gallery of the face of the fields and woods and streams for each of the summer months, but he has written delightful descriptions of the country in its various aspects, descriptions which could only come from one who is familiar with Nature in her varied moods. Of all the books which we have lately had the pleasure of seeing, we know of none that would be more acceptable as a present to either man, woman, boy, or girl having the slightest regard for the beauties of Nature—and who, nowadays, that is blest with all his or her faculties, has not? But there is a further charm in Mr. Step's volumes. In taking his photographs he has had an eye for the artistic. Most of his illustrations are 'pictures.' The flowers and fruit and foliage are also so clearly and accurately portrayed that the illustrations in the books (of which there are some 340) will be found most useful to the daily increasing number of students who look to natural objects for designs, to be put to a variety of uses. By way of variety, we suppose, Mr. Step has introduced a few photographs of birds' nests, etc., but these are not nearly so successful as his plants, and would, in our opinion, have been better omitted. This, however, is the only grumble we can make.

I go a-walking. (T. N. Foulis, Edinburgh.) Under this heading three sixpenny pamphlets have been issued, containing 100 pages in all, and constitute a volume. We understand three others are to follow, which will form a second volume, though the whole six would be a by no means thick



Young Wagtails.

book. The parts already published are entitled 'Through the Country Lanes,' 'Through the Meadows,' and 'By the Stream and Lake.' Each contains a magnificent set of appropriate illustrations, from photographs, respecting which we have nothing but praise. One of these we are kindly permitted to reproduce. The accompanying letterpress, however, is but scrappy, and has been culled from various sources.

The Essex Field Club has issued a useful 'Year Book and Calendar for 1905-6' (1s. net). It contains the fixtures for the year, a record of the club's work, reports of the council, treasurer, and other official matters. There are illustrations from photographs of the Essex Museum and Queen Elizabeth's Lodge, Epping Forest. A photograph of Mr. William Cole, the founder of the club, and for 25 years its secretary, appears as frontispiece.

Mineralogy. By **Frank Rutley, F.G.S.** Fourteenth Edition. Thomas Murby & Co.

This excellent little manual can be thoroughly recommended to all students interested in the fascinating study of mineralogy. It forms a very suitable introduction to this study, and Mr. Rutley's reputation is a sufficient guarantee of the accuracy of the matter contained therein.

A Junior Course of Practical Zoology. By the late **A. Milnes Marshall** and the late **C. Herbert Hurst.** Sixth Edition. Smith, Elder & Co. 1905.

A new edition of this well-known handbook has just been issued, having been revised by Dr. F. W. Gamble, of the Manchester University. In the present edition accounts of *Monocystis*, *Coccidium*, and *Obelia* have been added, and throughout the text has been brought up to date. Dr. Gamble has used every care to present the latest information before the student. By a judicious arrangement of clarendon type, capitals, etc., the principal parts are easily caught by the eye. There is also a wealth of illustrations, which have been very carefully selected. But the fact that the work has reached a sixth edition speaks for itself. The printers have done their share of the work well.

NORTHERN NEWS.

'Natural History as a Hobby' is the title of a paper in 'Institute Notes' (Hull), from the pen of Mr. T. Sheppard, F.G.S.

The Rev. J. Conway Walter, of Langton Rectory, Horncastle, has just completed 50 years of clerical life, and seems as active as ever.

The section in the Boulder-clay near Withernsea, figured and described in this journal for October, has since been washed away by the sea.

A perfect specimen of *Dasyptolia templi* (male) was taken at rest on an electric light standard at West Hartlepool on 3rd October ('Entomologist,' November).

A single nest containing no fewer than fifteen young brown rats was recently unearthed on the bank of the River Hull near Wawne Ferry.—'Hull Daily News.'

A strong complaint is being made of the silting up of the Ouse near Selby. To such an extent is this going on that boats plying between the Humber and York are experiencing great difficulty.

Judging from Mr. E. L. Gill's remarks in the 'Report of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, the Museum at Newcastle at the present time is receiving a thorough overhauling at his hands.

A writer in a contemporary asks 'if the bananas sold in the shops at Bradford really are bananas, or some other fruit.' Without professing to have expert knowledge, we should certainly be inclined to say that the *bananas* sold are bananas!

Amongst the objects found as a result of the recent scouring of the cliffs in Holderness, the local press records a 'mammoth foot'! Inquiry, however, shows this to be a stone 'shaped something like a mammoth foot.' Need we add that it was found near Hornsea.

Amongst the recent additions to the Carlisle Museum is a collection of local and British birds' eggs consisting of a hundred and fifty authenticated sets formed by Mr. J. T. Oliphant, of Carlisle. The series has been purchased and presented to the Museum by Mr. Thorpe.

At the recent annual meeting of the Yorkshire Geological and Polytechnic Society the words 'and Polytechnic' were dropped from the title. This change has been more than once suggested in these columns. Under its new and more accurate title may the society long flourish.

In the middle of September three curious birds were noticed round some beehives at Bentham, Yorkshire. One took up a position near the entrance to a hive, and swallowed eight bees in quick succession. It was shot, and proved to be a specimen of the rare bee-eater, *Merops apiaster*.

At a recent meeting of the Chester Society of Natural Science a presentation was made to Mr. Robert Newstead, formerly curator of the Grosvenor Museum, and now attached to the Liverpool School of Tropical Medicine. The gift consisted of a life-size carbon portrait of himself, and a purse of more than two hundred guineas.

We extract the following from a Hull paper:—'RARE BIRD SHOT AT WAWNE.—Mr. John Crozier, gamekeeper, on Wednesday shot when it was flying over Woody Carr, near Wawne, a splendid specimen of the buzzard, which measured 4 ft. 2 in. from tip to tip of its wings.' We suppose there is such an Act as the Wild Birds Protection Act!

Mr. H. C. Hawley, of Turnby Lawn, near Boston, informs us that a Small Owl was seen at Turnby on Saturday, 28th October. His brother watched it for some time in full daylight. It was being mobbed by a number of Thrushes as large as itself and eventually disappeared in a plantation. This Owl is also recorded as having been recently shot at Southey, close by. The bird was not shot, but there could be scarcely any doubt as to its identity.

CLASSIFIED INDEX.

COMPILED BY W. E. L. WATTAM.

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CORRIGENDA.

Page 59, line 5, for 7 or 8 iron and manganese read 8·2 magnesia and manganese.

Page 60, line 22, for insoluble read the soluble.

Page 217 (and on Plate XVI.), for Charles Street read James Street.

Page 225, line 9, for Mycologist read Malacologist.

Page 268, line 29, for *dryophilus* read *dryophila*.

Page 268, line 38, delete = *stercoraria*.

Page 268, line 43, for *micaceous* read *micaceus*.

Page 275, line 1, for lichen-starch read mucilage.

Page 323, line 7, for basalt read basal.

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